X Window System Protocol

X Consortium Standard

Robert W. Scheifler

X Window System Protocol: X Consortium Standard

© !" ! !! # $ # % & ' (

) * + , + + + (* - . , ./ + , , ((+ , (* (* + * (+ ((+0 , + * , * , (+ + (1 , + 2

% 3 + * (+ + (
,

%45 &6% 7 5 8) & 8959 :7 8 ; 8%4&<% 7 7=%> &6 7=> ?8=9 5) 5 & 8@)A859 8= A<98='
B<% =&% A8@8%59 %& %45 7 7=%85 &6 @5 47=%7B8A8%> 68%=5 6& 7)7 %8 <A7)<)& 5 7=9
=&=8=6 8='5@5=% 8= =& 5 5=% 47AA %45 &)5= ' &<) B5 A87BA5 6& 7=> A78@ 97@7'5 &
&%45 A87B8A8%> 45%45 8= 7= 7 %8&= &6 &=% 7 % %& % & &%45 8 5 7 8 8=' 6 &@ &<% &6
& 8= &==5 %8&= 8%4 %45 &6% 7 5 & %45 < 5 & &%45 957A8=' 8= %45 &6% 7 5

5C + * & ' ((+ +3 ,
* (+ , , (, (D * & ' (

+ , * + * E % & ' (

Table of Contents

7 E , + * 3
) 6 *
F(6 *
6 *
5 6 *
53 6 *
$ 3 $
G ** % G
5 "
H ? + !
")
) + + 7 *
! ($
8 $
3 $
3 8 * #
8 * H
(8 * "
F(!
+ , !
+ ,7 ($
' + ,7 ($$
9 + , $G
9 (, + , $G
3 $#
+ , $#
@ + , $#
@ (, + , $H
< * + , $H
< * (, + , $H
(+ , $H
(+ , $!
' ' * $!
I(% $!
8 7 * $
' 7 *= * $
) $
9) G
') G
) G
A) G
&, G
' &, G$
3 G$
+53 G$
') GG
<) G#
' B(GH
< B(GH
7 3) ' G"
' ? + G"

< ? + G
' ? G
< ? G!
7 ,53 G!
' 3 #
< 3 #
I( ) #
' @ 53 #
% + #
) #
8 (6 (#$
' 8 (6 (#$
I(? * #$
& 6 #G
6 #G
I(6 #G
I(% C 5C #"
A 6 #
A 6 8 #
6) #
' 6) #!
) C* #!
6) C* #!
' #!
' H#
' HH
9 HH
H"
6 ' H"
7 H
7 H
) H!
)) H!
) A H!
) * H
) H
) 7 "
6) "$
) 6 "$
) 6 7 "G
)(8* "G
' 8* "#
) % C ! "H
) % C " ""
8* % C ! ""
8* % C " "
* "
6 * "!
* 7 +6 "!
8 * "!
< * "
A 8 + * "
7 "
7 = * +

7
7)
6

= * + $
I($
A E($
(G
' (G
6 (#
(#
I(B D #
I(5C H
A 5C H
@ + @ H
' @ + @ "
? +@ "
' ? +@
? +
' ? + !
B
) @
') @ !
) !
') !
3 !
' 3 !
6 3 !
4 !
A 4 !$
7 !G
9 , @ + !G
? !G
= & !G
!#
53 !H
8 (9 3 3 !H
) + , 3 !"
8 (6 (3 !!
? * =
5C
' 5C (
= 5C ($
= $
= G
9 = G
< * = G
@ = #
@ F(#
= #
(= #
' 3 = H
D F(H
(F(H

(= "
(F("
) = "
"
F(
=
* =
@ = !
@ !
$ 6 , + (
7 ?5> >@ 5 +
?5> >@
A ?5> >@
< + ?5> >@
6(?5> >@
+ ?5> >@
A ?5> >@
B) 5 + $
3 $
** % G$
5 GH
? + G!
) G!
) + + 7 * G!
(G
F(#
53 H
' !H
8 + C #

Acknowledgements

% * (2

J 9 3 3 -9 4) /

J B E ' 3 -9 4) /

J K * ' -@8%0) 1 7 9 /

J) ? -9 A/

J @ ' -9 '/

J * -9 <5'/

J 9 3 + - (/

J 9 3 -9 <5'/

% * * 3 , 3 + + (((2

J (7 + -9 /

J * + 9 , -9 /

J % ++ = ,* -9 /

% 3 + 3 , , 3 + + (((2

J 7 + , -B E /

J B(6 -9 /

J 9 ' E -4)/

J A 4 (3 D -= C /

J B E ? D -4)/

J 9 3 + A + , - /

J 9 3 @ -8 /

J = ,* -@8%/

J K &((-B E /

J 7 + ,) -8% @</

J , E -@8%/

J % - (/

J K * - /

% E 7 @ 9 L <5' 9 (* ' (*
+ (*

% + (* + * 3 + * F(+
((+ + 3 , * *

% * * * * * ++
* = * * ++ (+ ((
8 * E * + ++ 3 + *
*

(* 8

Chapter 1. Protocol Formats

Request Format

53 F(! + " C +
((53 F((+ -
* 1 + + + + / , + D * +
+ + % + + F(
(+ + % + F(*(F(* *(*
F(+ F(8 + *
F(+ + < (+ F(F(+
D @ 1 + $! ($HH 3 + 5C
+ + *(F(C F(3
++ + + + + F(+
4 , 3 * + * + +
+ C F(+ + 53 F(
3 * + ,
(+ + 3

Reply Format

53 G$ + C + ((53
G$, + D * ++ +
+ + < (+ , (+
D 53 " F((*
+ F(

Error Format

5 G$ 53 (+ ! + 5
+ $! ($HH 3 + C 53 (+
* 1 + * + + F(+ "
F((* F(6 , - # /
(89 (+2
+ 6 * (+ 6
3 ((+ & (++
+ < (+ , (+ D

Event Format

G$ < (+ , 3 (+
D 53 3 ! + % * +
3 , + * !" F(53 + "# (
$ 3 + C (+ + *
* (3 53 3 -, C
#$ % &$ / " F((*
F((+ , - (/ +
3

Chapter 2. Syntactic Conventions

% + (* (, 3

J % C M N 3

J % C O P ((*

J 8 %>)5 (+ " D +

J F(+ + , * 2

RequestName

arg1: type1
...
argN: typeN
#
result1: type1
...
resultM: typeM

Errors: kind1, ..., kindK

Description.

8 Q + F(-
(/ (* + 8 QR (+ *
+ F(

J 53 + + , * 2

EventName

value1: type1
...
valueN: typeN

Description.

Chapter 3. Common Types

%	
A8 % 6&&	7 * * A8 % 6&& * (+ * 6&& % D + * 3 - * D 6&&/ + * * * 8 (+ 7 + C B 5C , C + D
B8%@7 ?	% B8%@7 ? + A8 % 7A<5 *, (F((*
A8 % 7A<5	*2 2 B8%@7 ? 2 A8 % 7A<5 % (+ , (((* % 3 (* E , (* 3 + +S ((* + (F(% B8% @7 ?, * + + (* % ((+ 3 (* E *(D - 3 / % 3 (3 (* E * * * E 5 3 (+, (((3 ((F(+ % 3 (((+ + *
&	7 * .% % . * (+ + 7 * 3 * , (
8=9&	G$ 3 (- (+ D /
)8 @7)	G$ 3 (- (+ D /
< &	G$ 3 (- (+ D /
6&=%	G$ 3 (- (+ D /
' &=%5 %	G$ 3 (- (+ D /
&A& @7)	G$ 3 (- (+ D /
9 7 7BA5	8=9&)8 @7)
6&=%7BA5	6&=% ' &=%5 %
7%&@	G$ 3 (- (+ D /
8 <7A89	G$ 3 (- (+ D /
7A<5	G$ F(-(+ A8 % 7A<5/
B>%5	! 3 (
8=%!	! +

%	
8=% "	" +
8=%G$	G$ +
7 9!	! (+
7 9 "	" (+
7 9G$	G$ (+
%8@5 %7@)	7 9G$
B8%' 7 8%>	M ' % % % ! ! ! N
8=' 7 8%>	M(% % % ! ! ! N
B&&A	M) N
5 5=%	M# $ # $* + , , , * ! - " . . / , 0. , 1. , 2. , 3. , 4. , . ! $ ' % &$ * 5 * % &$ * ' $ ' ' # $ N
)&8=%5 5 5=%	M, , * ! - " . . / , 0. , 1. , 2. , 3. , 4. , . # $ N
95 8 55 5=%	M# $ # $* , , * . , 0. , 1. , 2. , 3. , 4. , . N
?5> >@	G$ 3 (- (+ D /
?5> &95	7 9!
B<%%&=	7 9!
?5>@7 ?	M & - 6 . 0 . 1 . 2 . 3 . 4 N
B<%@7 ?	M, 0 , 1 , 2 , 3 , 4 N
?5>B<%@7 ?	?5>@7 ? B<%@7 ?
% 8='!	A8 % 7 9!
% 8=' "	A8 % 47 $B
47 $B	O $2 7 9!P
)&8=%	OC 2 8=% "P
5 %7='A5	OC 2 8=% "

%	
	, + 2 7 9 "P
7	OC 2 8=% "
	, + 2 7 9 "
	$2 8=% "P
4& %	O * 2 M 7 " ! N
	++ 2 A8 % B>%5P

% OC P + 5 %7='A5 (

% * % 8=' "
* + , (+ + C , + * * C (
47 $B 7 9 " % + K8 08 & * + + C
$ 8 C + * , + + , $
* C + C 6 (+ , + C 47 $B
+ " (* *
% * (+ , * (" 3 (*
3 , 3 , 47 $B F(

% * + 4& % ++ *
- ' / F(/

Chapter 4. Errors

8 , F(* , F(+
- C (/ % F(,
(' ' $) 8 $) 07
+ '#$

% , + (*3 (F(,2

!

7 * *+ E 0(*
+ + 7 *
*+ * +
*
+, , 7 * *+
+ (+ *
7 * *+ *+
* - , (
D+ / 7 * *+ 3
* ,
+ +

% 3 + F(+ (
= C
F(3 3
3 + ++ 3 3
((*++
3 % * , 3 ((
(+ (3 *
F(
+ (+ + 3 (
+ + + + *

7 3 (7%&@ (* + * +
+ 7%&@

7 3 (&A& @7) (* + *
+ + &A& @7)

7 3 (< & (* + * +
+ < &

7 3 (9 7 7BA5 (* + *
+ + 8=9&)8 @7)

7 3 (6&=% (* + * +
+ 6&=% 7 3 (6&=%7BA5 (* +
* + + 6&=% + + '&=%5 %

7 3 ('&=%5 % (* + *
+ + '&=%5 %

% 3 ((+
(+ + +
+ (

% 3 + * * *
F(7 3

!	
	F(+ 7 (+ F(((+ + 3 (+ + + + *
- '	% F(F(+ * * (* % F(C + * C *(* + 3
.	7 + $, + , (+ 9 7 7BA5 8 F(' &=%5 % (* + 3 * + + + 9 7 7BA5 (* * (* - (* / + (* * , F(+ F(
%	7 + * + C
	7 3 ( )8 @7) (* + * + +)8 @7)
* 9	% * 1 * + + 3 + F(
	* (* 3 ((+ 3 (+ F(< + (* (+ + (* L + 7 (* + + 3 -+(+ /
	7 3 (8=9& (* + * + + 8=9&

%

% +
(+ , (* C + + (
, C + 3 C * T 8=9& *
% U

Chapter 5. Keyboards

7 ?5> &95 - / E ? + (3
O! $HHP 7 E + 3 (* (3
* * * * + * * - C * * C/
+ 3 + + % * , E +
E + + (

7 ?5> >@ + * E % + +
?5> >@ (+ A A $ A G A # ? 7
' E %)(7)A 4 , % + ? ,
* ** E + - (4 % + / ?5> >@ ,
* - $ / 3 + 3 +

7 ?5> >@ + , ?5> &95 % + + 3
* + E 8 - = *
/ ?5> >@ . . + , .
= * = * . 8 - = * /
?5> >@ . . + , . . 8
- = * / ?5> >@ . ! .
+ , . ! = * . C .3 +.
* + + 3 (+ * (+

% (* , (?5> >@ ' (
+ + ?5> >@ ' ($ + + (
?5> >@ (+ * (= *
((+ + + * , *
* C , * ?5> >@ . . ,
, + (* + + 8 ((+
+ * , , * . . + +
* , (* . .

% + + (?5> >@ * **#$** 3 *E (
' (+ ' ($?5> >@ S ?5> >@
+ + % * + + * , ((,
, (+ ?5> >@ * + @&95 8% 4
?5> >@ * ?5> &95 + ?5> &95
* + **. 0** (**. 4** % * + + . . 6
?5> &95 ' ((+ , (* + + ' ($ (+
, (* +

% **- 6** * + + A E , ?5> >@ * + 7)
A& ? + * ?5> &95 + ?5> &95 + **- 6**
* + % **- 6** * + + A E , ?5> >@ * +
486% A& ? + * ?5> &95 + ?5> &95 +
- 6 * + 8 **- 6** * + (+ + A E +
A E A E (+

% .E +. E + ?5> >@ * + =<@ A& ?
?5> >@ * ?5> &95 + ?5> &95
* + **. 0** (**. 4** % * + + . (* E
* + . % + + ?5> >@ , C ?5>)79 * +
.E +. ?5> >@ S ?5> >@ , (* 3 (C + *

VC66! VC66B9 (3 8 ++ 3 + ?5> >@
C + * VC VC 6666 E + ?5> >@

(?5> >@ + * + (
+ * , 2

J % (* E * + + + ?5> >@ E + ?5> >@ 8
& * + - 6 * + + +
A E ?5> >@ (+S , + ?5> >@ (+

J % & + - 6 * + 8 ?5> >@ (+

J % & * + + - 6 * + + +
A E 8 ?5> >@ (+ (?5> >@ ,
+ (?5> >@ (+ +

J % & * + + - 6 * + + +
A E 8 + ?5> >@ (+ (?5> >@ ,
+ (?5> >@ (+ +

J % & * + - 6 * + + + A E
8 + ?5> >@ (+

% * , ?5> &95 + ?5> >@ (+ + 3 S
* + + + ,

Chapter 6. Pointers

B(, (* + ,

Chapter 7. Predefined Atoms

) + + * + * ((3
* (, * * F(*
= + + 3 (* 3 (
3 F(+ * % * *
* (* + + , * + +
(" # # # $ + % & '
(#

% , * 3 + + * 3 (= (+ ,
*

7
7%&@
B8%@7)
7)W458'4%
7 98=7A
&A& @7)
&)> 8'4%
< &
<%WB<665
<%WB<665
<%WB<665 $
<%WB<665 G
<%WB<665 #
<%WB<665 H
<%WB<665 "
<%WB<665
9 7 7BA5
5=9W)7 5
67@8A>W=7@5
6&=%
6&=%W=7@5
6<AAW=7@5
8=%5'5

8%7A8 W7='A5
@7 W)7 5
@8=W)7 5
=& @W)7 5
=&%8 5
)8 @7)
)&8=%
)&8=%W 8X5
) 8@7 >
I<79W 89%4
5 %7='A5
5 &A<%8&=
5 &< 5W@7=7'5
'BWB5 %W@7)
'BWBA<5W@7)
'BW &A& W@7)
'BW9567<A%W@7)
'BW' 7>W@7)
'BW' 55=W@7)
'BW 59W@7)
5 &=97 >
% 8?5&<%W7 5=%
% 8?5&<%W95 5=%

% 3 + , ((* , * * * +
- 3 * 3 (* + / *
, (+ (+ (+ * 3
(3 + D % (, 3 + +
D ++ C + (+ 4 , 3 +
+ * * (C 6 * 3
+ ((+ (+
, + (+ (+ 3 + , *

% 8='
<B 8)%W
<B 8)%W>
<)5 8)%W
<)5 8)%W>
<=95 A8=5W)& 8%8&=
<=95 A8=5W%48 ?=5
8 <7A89
58'4%
8=9&
@W A7
@W A85=%W@7 48=5
@W &@@7=9
@W48=%
@W8 &=W=7@5
@W8 &=W 8X5
@W=7@5
@W=& @7AW48=%
@W 8X5W48=%
@W% 7= 85=%W6&
@WX&&@W48=%
W458'4%

Chapter 8. Connection Setup

6 * (*

Connection Initiation

% *(+ + + * +
% 3 (*($ H# % 3 ($ -7 88 (B/
* 3 (* + * + 3 (H# -7 88 ,
/ * 3 (* + 5C , C
+ " + G$ F(*(
* + , + + " + G$ F((+
3 , * + , +

6 , + + , *
(2

* 1 3 2 7 9 "

* 3 2 7 9 "

(D * 2 % 8='!

(D + 2 % 8='!

% 3 (* + , 3 C
3 * *

% (D * + , (D - + (/
C 3 (+ +
3 + (D * * 7 3
+ * * C * *
+ * * * * * 8 * +
+ * + . C (D .

Server Response

% 3 , * (2

J (2 M N

% 3 , ++ + (+ (3 (
+ ((+2

* 1 3 2 7 9 "

* 3 2 7 9 "

2 % 8='!

% 3 , ++ + (+ (3 (
+ ((F(+2

2 % 8='!

% (D (
% * (+ C
*(3 (* , * 3
(3 (

% 3 , ++ + (+ (3 (
+ ((+2

* 1 3 2 7 9 "

* 3 2 7 9 "

3 + 2 % 8='!

(* 2 7 9G$

(+ (+ * E2 7 9G$

* + 2 M - , . , N

* (2 M! " G$N

* +2 M! " G$N

* + 2 M - ' & . ' & N

C* * 2 A8 % 6& @7%

2 A8 % 55=

* (D 2 7 9G$

* C *(* F(2 7 9 "

* E + * C E + 2 ?5> &95

, 2

6& @7%2 O+ 2 7 9!

_ C 2 M # ! " $# G$N

_ +2 M! " G$NP

55=2 O 2 8=9&

_ , + C C 2
7 9 "

_ , + * * *
* 2 7 9 "

_ , + + 2 A8 % 95)%4

_ + 2 7 9!

_ 3 (2 8 <7A89

_ + (* 2 &A& @7)

_ , C E C 2 7 9G$

_ * + * * C
+ * 2 7 9 "

_	E 2 M= 3
	@ + 7 , N
_	3 (+ 2 B&&A
_	((* E 2
	5% 5 5=%P
95)%42	O+ 2 7 9!
_	3 (2 A8 % 8 <7A%>)5P
8 <7A%>)52	O3 (+2 8 <7A89
_	2 M '
	% (') (+
	9 N
_	+ * E * E (* E2
	7 9G$
_	3 (2 7 9!
_	* 2 7 9 "P

Server Information

% * 3 2

% 3 (* ((3
8 * 1 3 , (+ * *
+ * 3 , (+ * * (, + *
B * 1 3 , + * 3
, % 3 (* (+ + 3
((% * F(3 % 3
- (+ / (* + 3
3 (7 3 - (+ / (* 3
*((

% 3 + 3 * + , 3 * *
% 3 + * (*

% (+ * E ((- !/ %
(89 8=9&)8 @7) < & 6&=% ' &=%5 %
+ &A& @7) 3 (, * (+
& , (+ & 3 ((+ , (+
* , + (3 (89 3 3
% + ((
(89 & 89 + (+ 7 89 *((F(,
89 (1((*
4 , 3 3 ((+ * 3 (+ +
E * + (+ C + (F(+ + 1 S
C * 3 (* 3 (* 3 + , + , 89 3 + *
+ 3 + E *

7 (3 , + *
* , * + + 3 + * - (+ + /
+ 3 % + * 3 * + +
(> * - * * / + C 3 (
X *

7 * + 5 ++ + *(
3 * + % + 3 (%
F(D + *(3 * (% *
(, F(* +
(* * *
(3 * + 8 C* + > *
+ * + * *
+ , ++ ,

) C* * 3 (% +
) (+ * + 7 + (+ +
(+ + (+ *((
X * + 8 X * C +
, % (* (+ + C 3
C B C * F(+ + ,
(+ + C* + + 3 (
((+ + (+ + C # +
* * + C
* + * * 5 ++ + *(
3 + C , +
* +

4 , + 3 * (3 * * +
= * + + *

% 3 * * ++
(+ . % &$ 3 % . !" F(
* E (3 % * (D 3 C * * C
((* * (

@ C *(* F(* C *(* F(+
3 # (% * C *(* 3 (
+ F(F(* C *(* - '
+ 3 , + + * + + F(@ C *(*
F(, , # " - F((+
(+ "G!# , + 3 /

@ E + + * C E + * + E + 3 (
* + 3 @ E + 3 ! + * C E +
3 $HH = E + F(+ 3
+ E

Screen Information

% * 2

% , + + , C* + , + , + (+
) C* (+ + + + , + , + (+
3 (+ + 7 C* +
, (+ + + (, + , + * (+ 7
+ D 3 + (D + + $, + , , (
+

+ + 3 (+ + 3 (, + ,
+ C + C D , + , -,

+/ % , + , , + +
* * + * * (+ + * D
+

% + (* + , , + ,
, * * F(* , + , * +
* , * * + (

B E C +, C (+ * * * *
% C 3 (* + + (*
% ('B 3 (* * + *
(E +, % * + + 3 C + 3

% + , + , C* + , E C %
E (+ , + , C* + , * (+ ,
(E C +, C

@ + * (* * (+
+ *((-, / + (*
+ * @ C + * * C *(* (* *
* + *((+ + @(
3 (* , + (+ (89
(+ + + * ((* 6
+, * 3 (,

B E + , 3 (E
(* * + (* , + , (
8 3 (+) 3 (3 (+ * +
+ ' (* * +

% ((3 , , (+ (
3 * E , + ,

Visual Information

% * 3 (2

7 3 3 (* + * + *

6 C 3 (+ C * +(+ + 'B
3 (S 'B 3 (+ + * $ +
* , C , * + 3 (+ +S
((+ , * 3 (+ + (
* 6 C 3 (+ * + 'B (+
+ (+ + C * + 3 (%
'B 3 (+ + *) + * ,
C * + + + 'B 3 (%
3 (3 + + (3 + *
* * + * , C
* + + + 'B 3 (, 3 + +
$ + * , C + + (
3 (F(C 3 ((+ $
, , * (* *

% + * E * E + (* E + + +
) 5 ((, < (
* E * (*

% 3 ($ (* +
3 (- + 3 +(/ + + (% (* +
(* * 7 ('B 3 (, +
, " (* , * *(* + "HHGH
* C *(* & +, 3 + D +
* , C 2

```
hw-intensity = protocol-intensity / (65536 / total-hw-intensities)
```

* + C + * % * + (*
3 * , + * 6 +
) , (($, * C *(* (*
+ * E * E + (* E

Chapter 9. Requests

CreateWindow

```
*              2  8=9&
      2 M    +                  + $          $                    N
       2  7 9!
       2  8 <7A89          $
    2 8=% "
*                    *          2  7 9 "
              2 B8%@7 ?
           2 A8 %  7A<5
5    2                                                  .

%    F(          ( *   + , + ,  +          +      , +

7              $                    *            E    *        7 +
D                    +                  $                  *      +      E    *
       7 3 (                  $                  *      3 (        E    *
     6                  +                  3 (      + +   *(       *
(    +          -                  .            ( / %  +     +        *
          (          *(                                  + $        -      .
  ( / 6                  + $          +   *(    D   -                .            ( /
 +    3 (  *(        (    +          -                                .            ( /
4 , 3              3    +     +

%    3                                  + $        , + , +     C        (
        F(     C  (          +                                  $%   &$        3     7
 + $    , + ,       ( +    + ,    -     (     +
    F(   /            + $          +       +              , + ,      +
                  (          +

%     +        *          C     D      +    >  C  3      ,
     O   P      (              +                  *     C
 +     + ,     C          5   , + ,  +  C*        ,     +
   * 6   , + ,             +      +         +  (

%  C  +     +          , + ,       3          L       +
            (        (            , + , -          / %  , +
 +                +   D  -      (+        + /  + *(       D
-                    ( / %     +  , +                          + $        , + , *(    D
-      .                ( /

%  , + ,      +              E     +  ,

%  3 ( * E  + 3 (              (        , + ,           C
        D + %         3 (     2
```

```
                                  )$
```

```
  E  ( +  C*                    )8 @7)        %              *    "
```

	)$
E (+ C	7 9G$
+ C*	)8 @7) $
+ C	7 9G$
3	B8%' 7 8%>
, 3	8=' 7 8%>
E	M% (& . $ N
E	7 9G$
E C	7 9G$
3 (+	B&&A
3 * E	5% 5 5=%
+ * E	5% 95 8 55 5=%
3 + +	B&&A
*	&A& @7) $
(	< & %

% + (3 (, (C D + 2

	&
E (+ C*	%
+ C*	$
3	'
, 3	%
E	% (&
E	
E C	D
3 (+	
3 * E	MN - * /
+ * E	MN - * /
3 + +	
*	$
(	%

& , (+ + + $, + , 2

J , 3

J 3 * E

J + * E

J 3 + +

J (

8 . (+ $, + ,

8 E (+ C* 3 3 + + (E (+ C* %
E (+ C* + , +, *(3 * + * +
- . (/ 7 D C* (+ (* D *
8 E (+ % + , +, + +
E (+ 8 E (+ * " + L E (+
(+ (, +, *(3 * + - .
(/ 8 E (+ % , +, , 3
E (+ % 7 L E (+ *+ % L
E (+ C* + * , +, E (+ F(+ 8 E
(+ C 3 3 + + (E (+ C* + E
(+ C* 3 C + C* (+ + D + , E
(+ C (+ E (+ E *+
E (+ C 3 (S * (+ (*
6 * " E (+ E (+ , ,
L E (+ & , E (+ ,
, +,

3 + 3 , +, +
3 3 * E 3 (*
, , +,L E (+(, +, E (+
% 8 E (+ % 3 (* , +,
* + , +, * * *
, +, S ,
C + (+ + 5C (3 +
3 E (+ %

% + , * E (+ 8
+ C* 3 3 + + (+ C* % + C* +
, +, *(3 * + * + - .
(/ 7 D C* (+ (* D *
8 $ 3 L + C* +-(F(
L + (+ +/ (, +,
*(3 * + - . (/ % C*
* + * C* 1 , + +
* E * C* 8 + C 3
3 + + (+ C* + + C* 3 C +
C* (+ + D + , + C (+ +
E *+ + C 3 (S * (+
(*

&((, +, , + + , +, +
3 +

% 3 + , , +, (+ + , +,
D+ +, 3 + , , +, (+ +
D+- & ' F(/

7 E . +3 3 *
(+ , , +, * +, (+ 7 E
$ +3 3 * 3 , , +,
(* +, (+ 8 3 * C (
3 , , +, + 7 3 (% (& +3 3
* ((3 * *
, , +, * + = 3 *
3 (+ * * 1(,

(+ 3 , + , 3
* C (3 , * + (3
* * *

8 3 (+) 3 +3 + , , + , * + 3
, + , (, (+

(+ , + , * +
(+ , + , (+ + + - + (,
, + , (/ F(((+
, + , (+ +

% E + -, /, , + , +
+ * + *(3 + E ++(3 (+ %
E C , 3 ((3 + E
% 3 3 + E 3
(+ + * , + C 3 (7
+ ++ , + , 3 (* +

% 3 * E + , 3 + , + , -
* 3 , + ,/ % + * E +
, 3 (+ + , + , ,
3 + , + ,

% 3 + + , * + (F(, + ,
(+ 3 + * * ,
+ , * * , , + ,

% * * (,
+ , 3 (*(+, * * (
* + , + , * * (F(%
* *(3 * 3 (+ , + , - .
(/ 8 $ + L * + - (
F(L * (+ +/ 4 , 3
, + , *(3 * 3 (- .
(/ + *(3 * % - . (/
6 C % F(% * +
* 1 , + + * E
* *

8 (+ , (+ , 3 , + , 8 %
+ L (, (+ , , + , +
L (, (**+ + +
(

% F(% &$ 3

% E (+ + + C* + (* + **+
(C * * +

(F(+ , E (+ + C* (+ +
, + , % 3 * * * E C*

ChangeWindowAttributes

* * 2 8=9&
2 B8%@7 ?
2 A8 % 7A<5
5 2 .

% 3 (* E +3 (, (+ % 3 (
+ *

, E (+ , E (+ C* E (+ C
3 + 3 (E (+ , + , + C
+ C* 3 + 3 (+

E (++ (, +, +
+ E (+ (+
(+ + E (+ , +,
% * " + (E (+ C*
+ , +, $ + (+ C*

, 3 + (, +,

E (+, +, . $
E E C 3 (+ * +, +,
* 3 **+

@((* , +,S 3 * E + 1
3 + , + + 4, 3
* *
* * 5 * + *
, 7 * 3 (

% + * E , +,

* , +, - + , *
C * / % &$ 3
* 3 , +, * 3 **+ -
F(/

(, +, % + ((

% + , (3 + + + 3 + + 8
+ ((* 3 +

GetWindowAttributes

* * 2 8=9&

Q

3 (2 8 <7A89

2 M + + $ N

3 2 B8%' 7 8%>

, 3 2 8=' 7 8%>

E 2 M % (& . $ N

E 2 7 9G$

E C 2 7 9G$

3 (+ 2 B&&A

* 2 &A& @7) %

* +2 B&&A

* 2 M ((" N

3 * E (3 * E2 5% 5 5=%

+ * E2 5% 95 8 55 5=%

3 + + 2 B&&A

5 2

% F((((, + , 7 , + , (" * + (* (* + 7 3 * E (3 & 3 * E + , + , >(3 * E 3 * E + F(

DestroyWindow

* * 2 8=9&

5 2

8 (* , + , * + (F(* + (* % , + , + + + + $% &$ 3 + , + , % + $% &$ 3 (3 , + , $% &$ + , + , + , % + * + (, +

= * C (* (+ , + , * +

8 , + , , + , F(

DestroySubwindows

* * 2 8=9&

5 2

% F(* $ F(+ , + , * E +

ChangeSaveSet

* * 2 8=9&

2 M N

5 2 .

% F(++ * 3 + , + , * L 3 %
, + , *(3 + * - . (/
6 (* ((3

, + , + + 3 (* * 3 * * 3

ReparentWindow

* * 2 8=9&

2 8=% "

5 2 .

8 , + , * + (F(* + (*
% , + , * 3 + * (+
+ + + % C + + 3
L + , ((
, + , % , + , + E + ,
7 * % &$ 3 + % 3 + + (
, + , + 3 S 3 ( ) + , + , *
(+ * , , + , 6 , + , , * +
. F(* + (*

= * C (* (+ , + , * + % 3
* C (3 * (*
** + (+ *

7 . + 2 % , * +
% , , + , , + , % ,
+ $ + , + , % , + , * "
E (+ + , * + , + ,

MapWindow

* * 2 8=9&

5 2

8 , + , + * + F(

8 3 + + (, + , + *
+ * . * 9 3
+ (, + , * (* + & , , + , * + +
. % &$ 3 +

8 , + , , 3 , + 3 + ++ , + ,
+ , E (+ - E (+ + + C

+/ +D * C (3 + 8 E
* +, , +, , (* + C (3
+ 8 E , , * + (, +, C (,
+ & , 3 * + * + C
(E , 3 ,

MapSubwindows

* * 2 8=9&

5 2

% F(* . F((* + + ,
+, * E +

UnmapWindow

* * 2 8=9&

5 2

8 , +, + (* + F(& , ,
+, (* + + (% &$ 3 + = * C (
* (+, +, *+

UnmapSubwindows

* * 2 8=9&

5 2

% F(* (F(* + +
, +, * E +

ConfigureWindow

* * 2 8=9&
2 B8%@7 ?
2 A8 % 7A<5

5 2 .

% F((, +, % 3 (* E +3 (
, 3 (3 % 3 (2

	)$
C	8=% "
	8=% "
,+	7 9 "
	7 9 "
+ ,+	7 9 "
	8=9&
E*+	M " ,) & , & + N

% C + + 3 L +
((, + , % , + + +
D (+ + +*(D - (/ %
3 (+ E * C * , + , =
1(+ , + 3 (, + , C +
(* 3 (, + ,L 8 .
* * E + , + + $, + , D

8 3 + + (, + , + *
+ * &' *9 3
+ + (* + & , ,
* +2

8 * + * 5 * , + , + +
, + , + , + , + * 5 * 9 3
+ + (+ , + + (+ + =
3 + + (, + , * 5 * +
* + 3 * 5 *
, + ,

% * , + , + + , + , E +
* + &' % &$ 3 + ,
+ , (8 + , + , + , (
+ + , + , + + , 3
5C (* + * (+ , + , - (+
, + , + *, (+ (, /
5C (* + , , + , -
(, + / + , , + ,

8 + , + , + , + (, + , * 3 +
+ + , + , (* 3 ,
, + , + , + , + , + , (
* 3 + + + 3 , + , 8 (+
(+ + + , 3 6 , + +
+ 4 , + OC P 2

%	O P
%	O 0$ P
% !	O P
	O 40$P
	O 0$ 40$P
!	O 40$P
	O 4P
	O 0$ 4P
!	O 4P

, + , , 3 D + +
+ C , + , , + , ,
, 3 , + , D + +

+ , + , , %
" $% &$ 3 " $% &$ 3 +
&' % &$ 3 +

7 3 + (+ * 3 3
, + , 8 D , + , (+ ,
O >P 3 C
O >P + , 3 + ,
D + O >P = 3 E , , +
, + , + , , + , * * 3 +

7 3 ' + , + , , + ++
D 3 E 3 (+ F(+ %
, + , + , E (+ - C E (+ + + C
+/ + D * C (3 +

% + + + L 3
7 3 * + + 3 + (
'
+

7 , 3 (E % (+ (* + ,
D + + (% &$ 3 + (% &$ 3
+ &' % &$ 3 +

8 + E * + + , + , E + , 2

" % , + , + 1(3
, % , + , + 1(,
) & 8 (+ , + , , + ,
+ E
, & 8 , + , (+ , + ,
+ * E
+ 8 (+ , + , , + ,
+ E & , , + ,
(+ , + , + *
E

8 E * + + (+ , + , E +
, 2

" % , + , + E
, % , + , + * E
) & 8 (+ , + , , + ,
+ E
, & 8 , + , (+ , + ,
+ * E
+ 8 (+ , + , , + ,
+ E & , , + ,
(+ , + , + *
E

8 . + , (E * + , + ,
(

= * (, &) & + + * +,
, + ,L * - + (*
F(/ *

7 * (, + , 3

CirculateWindow

* * 2 8=9&
2 M* - - /' N

5 2

8 * + * , + ,
* 9 3 + + (* + &
, , * + + % &$ 3 +
, + , (E +

6 * - , * + + - /
(+ + + E 6 - /'
, * + + - / (+ +
* E 5C (* + * (+
, + ,

GetGeometry

* 2 9 7 7BA5

Q
2 8=9&
+ 2 7 9!
C 2 8=% "
, + + , + 2 7 9 "
5 2

% F((+ (* + , % +
(* C 1 % C + + , + , ,
D C* 6 , + , C + + (
(, + , 3 L + , + +
+ D (+ +

8 + $, + , + , F(

QueryTree

* * 2 8=9&

Q
2 8=9&
2 8=9& %
+ 2 A8 % 8=9&

5 2

% F((+ + , + , %
+ + * E +

InternAtom

2 % 8='!

2 B&&A

Q

*2 7%&@ %

5 2

% F((* 3 * 8 C
* + + C % (+ (8 & A +
< + , *

% * * + 7 * * + + (
3 - /

GetAtomName

2 7%&@

Q

* 2 % 8='!

5 2

% F((* 3 *

ChangeProperty

* * 2 8=9&

2 7%&@

2 M! " G$N

2 M* N

2 A8 % 8=%! A8 % 8=% " A8 % 8=%G$

5 2 .

% F(+ , + , % (+
3 % * , + (+ 3 , +
! " G$ F(3 ,

8 * + * 3 (3 (+ + + 8 * +
+ * *(* C
3 (- . (/ 8 (+ + + + +
, + * , D + 6 +
E + C + + E +
+ C +

% F($% &$ 3 , + ,

% * +) * (
C + + (, + , + + (3 -
/

% * C *(* D 3 + + + * 3 + *

DeleteProperty

* * 2 8=9&
2 7%&@
5 2

% F(+ * + , + , C
+ $% &$ 3 , + , (+
C

GetProperty

* * 2 8=9&
2 7%&@
2 7%&@ $ $)$
2 7 9G$
2 B&&A
Q
2 7%&@ %
* 2 M ! " G$N
2 7 9G$
3 (2 A8 % 8=%! A8 % 8=% " A8 % 8=%G$
5 2

8 + + C + , + , (
% * + D + 3 (* % +
(* + 8 + C (+
* + ((
* (* - 3 D /
- 3 * " G$/ + 3 (
* % + (* + 8 + C
+ $ $)$ + + * (
((
* (* - 3 D / + +
3 (, 3 2

```
N = actual length of the stored property in bytes
    (even if the format is 16 or 32)
I = 4 * long-offset
T = N - I
```

```
 L = MINIMUM(T, 4 * long-length)
 A = N - (I + L)
```

% (+3 (+C 8 - +C * / +
A 4 , 3 3 (A
3 % 3 (7 3 (* (+
+ 8 +) + D
+ + * , + , + $% && 3 + , + ,

RotateProperties

* * 2 8=9&
2 8=% "
2 A8 % 7%&@
5 2 .

8 * 3 , + (* + * D
+ = * 3 (+,
* 8 * 3 (+, * -8 R + / * + =
8 * D = % + (+
3 (* - 3 + 3 + /

8 + * + = D $% && 3 +
+ +

8 * (* , * + +
, + , . + 8 . +
+

ListProperties

* * 2 8=9&
Q
* 2 A8 % 7%&@
5 2

% F((* (+ + , + ,

SetSelectionOwner

2 7%&@
* 2 8=9& %
2 %8@5 %7@))
5 2

% F(, , , + , + *
+ % F(+ *
(* + (3

* & , * + * ,)
+ (3 * 8 , , + , + %
, * % - , / & ,
, * C (F(8 , ,
-, % / * (, + (
, % (, 3

8 , * +-
+/ , , + , + F(+ +
, (* 3 % (
* +

% * (+ 3 % , , + , (+
+ F(+ + * 9 +
3

3

GetSelectionOwner

2 7%&@

Q

, 2 8=9& %

5 2

% F(((, , + , + 8
% (+ ,

ConvertSelection

2 7%&@

2 7%&@ %

2 8=9&

2 %8@5 %7@))

5 2

8 + , 3 + * 9 3
, 8 , + C 3
% &$ 3 F(, % % (*
+ (+ 3

SendEvent

2 8=9&

2 B&&A

2 5% 5 5=%

2 T * 3 * U

5 2

8 + + + , , + ,
8 + + (, + ,
+ + , , + , & , +
+ , (, + ,

8 3 * E * 3 +
+ , + , 8 C 3

8 3 3 +
3 3 * E

8) + 3 + + 3
3 * E + + , +
, * + 3 * E + 3
, + , + * E 8 (, + , C
, + , (, + , + ,
+ + 3 & ,
3 + 3 +
+ 3 * E

% 3 + *(3 3 + +
C - (/ 3 ,
% 3 , (+ +
(E + 3 C * 3 +
+ F((* 3

7 3 + F(

GrabPointer

* * 2 8=9&
* 2 B&&A
2 5%)&8=%5 5 5=%
2 M $ $ N
2 8=9& %
2 < & %
2 %8@5 %7@))
Q
(2 M $ 5 ") % N
5 2

% F(3 6(3
+ % F(3 + 3

8 , 3 + 3 + ,
, + , + + + 3 * E 8 , 3
) + + 3 , (+ * +
+ * & , 3 +, , + ,
+ + + 3 * E 6 3 (, 3
(+ 3 * + + +

8 * + $ 3 (* 8
(D 3
(* + 8 * + $ - *
/ D + (3 +
3 ((!" F((
+ 7 (,
D % * F((+

8 E + * + $ E + 3 (+
3 8 E + * + $ E +
- * / D + (E + 3
+ 3 ((!"
F((+ 7 (E +
, E + D % * F((+

8 (+ + + + , , + ,
8 (+ , , + ,
(, + , * (, + , + + & , (
, + , + +

8 , + , + , +
+ , + , % , + , + 3
, + , 8 , + , , + (
* + - + 0 3 3 + * / 1(
3 8 , + , (F((+
, , + (* E +
, + ,

% F(! % &$ + - " % &$ 3

% F(, ($ 3 +
* % F(, (5 D
3 % F(, (%
, + , , + , 3 , , + ,
* (+ (+ , + , % F(, (
") + * *
(3 * & , *
+ * ,) + (3 *

UngrabPointer

2 %8@5 %7@))

% F(3 + - *
, * * (/ +
F((+ 3 % F(+ *
* (3 *

% F(! % &$ + - " % &$ 3

7 (' F(* + (* 3 , + ,
, + , 3 * 3 , , + ,
((, + , * (+ (+
, + ,

GrabButton

2 5% ?5>@7 ? **$. &**

2 B<%%&= **$,**

* * 2 8=9&

* 2 B&&A

2 5%)&8=%5 5 5=%

2 M **$** **$** N

2 8=9& **%**

2 < & **%**

5 2

% F(3 8 ((3
+ + + * *
, (, + - * + , 3 / +
, 3 + , + (2 %
+ + + (+ ,
+ * + E + , + (* + E
+ , % , + , % , + , -
/ 3 , 7 3 * (0E * + C
, + ,

% * (* * %
3 * + (* ,
(+ + + * + E =
+ 3 - * / *
+ 3 3 D

% F(3 + 3 (3 * *
(0E * * , + , 7 * + **$. &** F(3
(F(* + * - (+
* * + / 8 F(+ + * + 3
(+ E + 7 (**$,** F(3 (
F((& , F(+ (
+ (+ (

7 + * + (+ ,
F(, * (0E * * , + , (
$. &** **$, F(* -
+/ + + *
% F(3

UngrabButton

2 5% ?5>@7 ? **$. &**

2 B<%%&= **$,**

* * 2 8=9&

5 2

% F(3 (0E * + , + ,
, + 7 * + (* $. & F(3
(F(* + * - (+ *
* + / 7 ($, F(3 (F(
(% F(3

ChangeActivePointerGrab

2 5%)&8=%5 5 5=%
2 < & %
2 %8@5 %7@))
5 2

% F(+ + * * 3
+ + + *
* + (3 * % 3 * E
+ (* % F(
* 3 + , ,

GrabKeyboard

* * 2 8=9&
* 2 B&&A
2 M $ $ N
2 %8@5 %7@))
Q
(2 M $ 5 ") % N
5 2

% F(3 E + 6(E 3 +
% F(3 + 3 E +

8 , 3 +E 3 +,
, + , 8 , 3) + + E 3 , (+ *
+ + * & , 3 +,
, + , B # $ + # $* 3 ,
+ + + 3 * +

8 E + * + $ E + 3 (*
8 E + (D E + 3
(* + 8 E + * + $ E + -
* / D = (E + 3 +
3 ((!" F(
(E + + 7 (E + ,
E + D % * F((+

8 * + $ 3 (+ 3
8 * + $ -

```
 *          /        D  =  (        3
+      3  (              (                                    !"          F(
 (     E    +        + 7  (                  ,
       D   %      *   F( ( +

%    F(                              +      +        3

%    F(      ,     (                  $                  E    +     3      +
   *          %    F(      ,     (                          5          E    +    D
      3                 %    F(      ,     (                                  %
   , + ,     3 ,    %    F(      ,     (                              "   )
  + *                E    +     *          (      3
 *  &   ,          E    +     *              +  * ,
  )              +      (      3    *
```

UngrabKeyboard

```
      2 %8@5 %7@)            )

%    F(          E    +                3      + -     (
            # $                  # $      /  +        F( ( + 3    %    F(
                 +  *                E    +     *
          (      3    *

%    F(                              +      +        3

7   ( '  # $                  * + ( *          3   , + ,        3
E    +      *     3 ,
```

GrabKey

```
      2 ?5> &95          $# $
            2  5%  ?5>@7 ?            $.   &
    *   *         2  8=9&
 *                2 B&&A
                                  2 M $                $                N
5    2

%    F(            3        E    +                              8    ( (     E    +
    3      +   +    +                    # $                  E    +     *
       *   ,     E  ,     + -     *   +                                  # $          3   /
 +        # $          3        +            ,     +        ( 2 %
E    +         +  +        + E  -,            * +    E  /
            + ,          + * +    E            + ,    +
    * +    E           + ,  5          , + ,           -
 /     ( , + ,        , + ,    +   +        ( , + ,  +
            7    3          * E    *      +      C
            , + ,

%                 *      (*         *                                    # $
%     3        *    + ( *      ,                E    +
```

+ E + + + * + E
= + 3 - * / *
+ 3 3 D

% F(3 + 3 (3 * *
E * * , + , 7 * + **$. &** F(3
(F(* + * - (+ *
* + / 8 F(+ * + + 3 (
+ E + 7 E **$# $** F(3 (F(
E + & , E *(+ * E +
+ * C E + (- (/

7 + * (+ **# $** ,
* E * * , + , (**$. &** **$# $**
F(* - +/ +
+ *

UngrabKey

2 ?5> &95 **$# $**
2 5% ?5>@7 ? **$. &**
* * 2 8=9&
5 2

% F(E * + , + , , +
7 * + (* **$. &** F(3 (
F(* + * - (+ * * +
/ 7 E **$# $** F(3 (F(E +
% F(3

AllowEvents

2 M **$** **$** * **$** **$ # $**
$ # $** * **$# $** **$, **$,** N
2 %8@5 %7@))
5 2

% F(* F((+ 3 (+ + 3 D
% F(+ * *
* 3 + *
(3 *

6 **$** D 3
(* 8 D , ,
$** , **$
D (+ +

6 **$** D + 3 +
3 (* (C , , *
3 + , * D
4 , 3 + 3 (+

+ D $ D
+

6 * $ 3 + + D
(3 3 - * 3
, * 3 (!" , *+ $ (
* / + + 3 *
+ * 3 3 - , + /
, + , 1(+ % F(
+ D (3

6 $ #$ E + D E + 3
(* 8 E + D ,
, $ #$, $ #$
E + D (E + + +

6 $ #$ E + D + 3 +
E + 3 (* (C #$ #$*
3 + , * E +
D 4 , 3 + 3 (E + +
E ++ D $ #$ E +
D E + +

6 * $#$ E + 3 + + D
(3 3 - * 3
#$ * 3 (!" , *+ $ #$ (*
#$ / E + + + 3 *
+ * 3 3 - , + /
, + , 1(+ % F(E +
+ E + D (3

6 $, +E + D 3
- +3 / (* (C , , *
#$ #$* 3 + ++
3 -(3 E 3 E +/ , *
+3 D 4 , 3 + 3 (
+ +3 + D -(+3 +
(F(3 , (+3 D / $,
(+E + D 8
E + D , , $,
, -((F(D $, , D +3
/

6 $, + E + D 3
+3 (* 8 +3 D ,
, $, , $,
(+E + D

$ $ + * $ 3
E + 3 $ #$ $ #$ + * $#$ 3
3

8 + E + 3 *((
- * + / +3 D

3 * + + 3 8 + 3
D (8 D *(+
3 + 8 + 3 D ,
!"

GrabServer

% F(+ F(+ + ,
F(3 +

UngrabServer

% F(F(+ + ,

QueryPointer

* * 2 8=9&
Q
2 8=9&
+2 8=9& %
* 2 B&&A
C , C , 2 8=% "
* E2 5% ?5>B<%@7 ?
5 2

% , + , + + 3
L (+ 8 *
* (* , + , + % + , C + , D
8 *) , C + , + 3
(* , + ,L + + +
% (* + E + ((+
= + 3 - * / *
+ 3 3 D

GetMotionEvents

2 %8@5 %7@))
* * 2 8=9&
Q
3 2 A8 % %8@5 && 9
, 2
%8@5 && 92 OC 2 8=% "
* 2 %8@5 %7@)P
5 2

% F((3 * (,
+ + * - (3 / + 3 + ,
- (+ + / + , + , * % C +
+ + 3 , + ,

8 * * * ((
3 (+ 8 * ((F(3
)

TranslateCoordinates

* * * * 2 8=9&
2 8=% "

Q
* 2 B&&A
+2 8=9& %
+ C + 2 8=% "
5 2

% C + + E 3 , + ,L +
(+ + C + + + 3 + , + ,L 8 *
, + , ++ , + , + ++ C
++ D 8 + + * + + + , + ,
+ (+

WarpPointer

* * 2 8=9& %
* * 2 8=9& %
2 8=% "
* 2 7 9 "
2 8=% "
5 2

8 + , + , % F(* 3 O+ C + P
3 (8 + , + , , + , F(
* 3 O+ C + P 3 + , + ,L 4 , 3
, + , % * 3 E , + ,
+ + + , + ,

% C + + 3 , + ,L 8
D + , (, + , * (8 , +
D + , (, + , + , * (C

% F((+ * 3 (+ , + ,
3 7 * , * 3
+ , + ,

% F(, 3 1((+ (* 3 +

SetInputFocus

2 8=9& * %
2 M * % N
2 %8@5 %7@))
5 2 .

% F(((+ (* % F(
+ * ((*
(3 * & , (*
+ * ,) + (3 *

8 % + (E + 3 + + + (, (
, + , 8 3 (* +

8 , + , + (* E +L (, + , 8
+ E + 3 , (+ * + , + ,
3 + * & , 3 + ,
(, + ,

8 * + ((, + , + * E
, + , , 3 E + 3 8
3 (* +

% F(+ + 3

% + (, + , *(3 , * F(- .
(/ 8 (, + , * 3 , , (,
+ , + + 3 (* 8 3 (3
- 3 , / + , 3 3 (E
% 8 3 * % (3 3 (
(3 + + 3 + (
(* +

GetInputFocus

Q
(2 8=9& * %
3 2 M * % N

% F((((

QueryKeymap

Q
E 2 A8 % 7 9!

% F((3 E + 5
+ + E (+ % 3
+ G$ B = - * / E != != R
, E != =
+ 3 - * / *
+ 3 3 D

OpenFont

2 6&=%
2 % 8='!
5 2 **%**

% F(+ + + + + ,
% * (+ (8 & A + + (+ ,
+ * :Y; + :Z; (+ *
* * + + * (+ 8 :Y;
- 3 (/ , * + :Z; - 3 (
H$/ , * (* 7 ((+ * *
+ & + + % & ' (#

6 + , (+ + *
C

CloseFont

2 6&=%
5 2

% F(+ , (89 + %
, + , (

QueryFont

2 6&=%7BA5
Q
2 6&=%8=6&
2 A8 % 47 8=6&
, 2 6&=%8=6&2 O+ , + 2 M **- &**
)* ' * ') - **&** N
* $ * C
$2 7 9 "
* * C 2
7 9!
C 2 B&&A
+ (2 7 9 "

* (+ 2 47 8=6&
* C (+ 2 47 8=6&
2 8=% "
+ 2 8=% "
2 A8 % 6&=%
) &)P
6&=%) &)2 O * 2 7%&@
3 (2 TG$ 3 (UP
47 8=6&2 O + 2 8=% "
+ 2 8=% "
, + 2 8=% "
2 8=% "
+ 2 8=% "
(2 7 9 "P

5 2

% F((* (8 C 3
(+ (+

% + , + 1(+ + , * 3
3 - &) * ' 3 * ') - & , + * %
+ (3 C

8 * + * C D * $
+ C + * + * C
$ + C * 8 *
* C D * $ + * C $,
$H" + $ + C 3 (+
* = - (* / 2

```
byte1 = N/D + min-byte1
byte2 = N\\D + min-char-or-byte2
```

, 2

```
D = max-char-or-byte2 - min-char-or-byte2 + 1
/ = integer division
\\ = integer modulus
```

8 D * (+ + * C (+ , +
+ 3 + , 2

```
L = D * (max-byte1 - min-byte1 + 1)
```

% + * C 3 * *
3 * (+ - + * C (+ / 8 C)
3 D (+ C

% + (, (+ , (+ +
C (+ = + (7 9 " 47 $B 6
($ * C * + (*
+ $ 8 + (
(+ + C *+ (+ +
C

% * (+ + * C (+ * *(* + * C *(* 3 (
+ 3 +(47 8=6& * 3 - C
/ % (+ C - *
+ (* * OC P/
(+ 2

```
[x + min-bounds.left-side-bearing, y - max-bounds.ascent]
```

, ,+ 2

```
max-bounds.right-side-bearing - min-bounds.left-side-bearing
```

+ 2

```
max-bounds.ascent + max-bounds.descent
```

% C 3 + (+
+ * * C + + % +
C , + (+ +
* * C + + 8
> + C (3 , >
+ 3 (- / + - R + /

7 (+ 3 %
3 (- C * 8=%G$ 7 9G$/ *(+ 3 + * E , +
7 + & + + % &
' (#

6 OC P (+ C - *
L / + + * 47 8=6& *
, (2

```
[x + left-side-bearing, y - ascent]
```

, ,+ 2

```
right-side-bearing - left-side-bearing
```

+ 2

```
ascent + descent
```

+ C + + 2

```
[x + character-width, y]
```

= 3 , + 1(, + +
-, + D C , > + + , /
+ 3 , + + , +
E + -, + D C , +
C + , /

= 47 8=6& * 3 (3

7 C + , 47 8=6& * D

% (+ 3 + +

QueryTextExtents

2 6&=%7BA5
2 % 8=' "
Q
+ , + 2 M - &) * ' * ') - & N
2 8=% "
+ 2 8=% "
3 2 8=% "
3 + 2 8=% "
3 , + 2 8=%G$
3 2 8=%G$
3 2 8=%G$
5 2

% F((C +
+ 8 C 3 (+ (+ %
+ , + + + * + + : $
% 3 * C *(* *
+ 3 + * C *(* + * % 3
, + (* , + *
6 (* , + *
+ A + *
(+ + *
(% 3 * *(* A +
3 * C *(*

6 + +, + C $ * C + C 3
, 47 $B " (* * + *
- 47 $B E *
/

, D * + 8 + ++ (
(+ + +

ListFonts

2 % 8='!

2 7 9 "

Q

* 2 A8 % % 8='!

% F((3 * - +
S F(/ * 7 * * C * *
, (+ % (+ (8 & A + + (
+ , + * 8 :Y; - 3 (/ ,
* + :Z; - 3 (H$/ , *
(* % (+ * ,

ListFontsWithInfo

2 % 8='!

2 7 9 "

Q

* 2 % 8='!

6&=%8=6&

2 7 9G$

, 2

6&=%8=6&2 T * + : $ U

% F(* - ((* (
% * (+ + , : $, (+ (
C * (+ = F(
*(* 3 + +
, * * , (+ % (* + *
* (* ((+ 7 D 3 (+
(* , (+ 7 ,
D * + + F(

SetFontPath

2 A8 % % 8='!

5 2

% F(+ E(%
3 %
* + + (+ + + +
+ +

* + (+ + 3

7 + C (F(3 (+ (+
* (, (C (89
+

% * * F(*

GetFontPath

Q
2 A8 % % 8='!

% F(((

CreatePixmap

2)8 @7)
* 2 9 7 7BA5
2 7 9!
* 2 7 9 "
5 2

% F(C* + + + % , + +
*(D - (/ % + *(
+ (+ + + , - (/
% C* (+ +

8 + $, + , + , F(

FreePixmap

2)8 @7)
5 2

% F(+ , (89 + C* %
C* , + , (

CreateGC

2 ' &=%5 %
* 2 9 7 7BA5
2 B8%@7 ?
2 A8 % 7A<5
5 2 .

% F(C + + + %
C (+, + + , 3 * ++
++ , S(, + , (.

% 3 (* E +3 (, * C
D + % C * 2

	)$
(	M * " $ " % + ; + % !9 " " + * " $ " + " % N
* E	7 9G$
(+	7 9G$
E (+	7 9G$
, +	7 9 "
	M + +&& N
	M % - , * < ' N
1	M. * , " N
	M) + 9 N
(	M!" + ' N
* +	M N
	)8 @7)
	)8 @7)
C	8=% "
	8=% "
	6&=%
(, + , * +	M ,$ & N
C (	B&&A
C	8=% "
	8=% "
* E	)8 @7) %
+	7 9 "
+	7 9!

8 3 (++ C (*(+
, + C S B *+
% * E (
(2

```
((src FUNC dst) AND plane-mask) OR (dst AND (NOT plane-mask))
```

E *+ 3 ((+ E (+
* E % * (+ (*

% * (2

	+
	7=9 +
* "	7=9 -=&% + /
$	
"	-=&% / 7=9 +
% +	+
;	& +
+	& +
%	-=&% / 7=9 -=&% + /
!9 "	-=&% / & +
"	=&% +
+ * "	& -=&% + /
$ "	=&%
+ "	-=&% / & +
%	-=&% / & -=&% + /

% , + * (+ C + F(, +
3 (D

+ + , + + + F(<
, + 1 (+ C , + ,
+ OC P OC$ $P + , + , , 3 ,
+ 2

```
[x1-(w*sn/2), y1+(w*cs/2)], [x1+(w*sn/2), y1-(w*cs/2)],
[x2-(w*sn/2), y2+(w*cs/2)], [x2+(w*sn/2), y2-(w*cs/2)]
```

% +
7 C - + + , / C (
+ (+ C , 3 , + 3 + 8
C C (+ C +
** + -C + /) C ,
D + + +
(+ ** + , - + / +
(+ ** + -C + / =
+ * * * + + C + , , +
+ + * * F(+ * * (* +
C + * ** + + * (
+ C , +

% -D , + / * C , + + , ((
+ + 3 + + * % ,
* 6 + , (+ * OC P OC$ $P +
+ , (+ * OC R+C R+ P OC$R+C $R+ P OC P
(+ + , + OCR+C R+ P (+
+ , + + 3 *

+ % ((+ + +
+ + , (+ (+
, + , (+

= , + + , * OC P OC$ $P , + , * C
, + + , * OC$ $P OC P (+ 1
8* * (+ * E ((
F(+ 7 , + D * + * , + , C
+ , 8 + , , + , , +
, + (* * C , , , + (
+ + , * 8 + + (*
(+ (+ , (, +
, + D

% + , + , 2

% (+ ,
% (+ , (3 +
+ + ++ + -
/ , , (+ , 3 + ++
+ *

++&& & 3 + + , +
+ + 3 +(+ - C
% - + , /

% + , + + , 2

% - % (F(3 , C
, + D + + ,

, % (F(+ - + (
/ , 1 +

***** % ((, + * F(
, + + + S F(3
, , + D

< ' % (F(+ (
(+ + + F(
, + S F(3 , , +
D

% 1 + , + , , + 2

. % (+ , C + *
4 , 3 +
," 1 (+ +

***** % ((, + * F(
, + + 1

," % (, + +
(+

6 , + + -C [C$ [$/ , +
+ * + + , + + 2

% -	% + 3 + + (+ + + ,
,	% + 3 + + (+ + C + ,
*	% * , 0
< '	% * , 0
, , +	= + ,
* , +	% + + + + , + * F(, +
< ' , +	% + F(+ , + C + + + , + F(, +

6 , + + -C [C$ [$/ , 1 + + , * 3 + * 3 4 , 3 - +(+ / 1 + , * , + +

% 0 , + * , 0 + + * (* + + , ((* 0 + , + , + 0 % 0 + + 3 , 3 + + , + F(

% C* *(3 * + + C - . (/ % C* *(3 + + *(3 * C - . (/ 6 - (**+ 9** / + + ++ * E 7=9 + , * E 7 D C* (+ (* D * (

% + (C + F(6 C + F(- C * **$) 8** **$) 07** **$ * '** **$** + **$** / , F(, - C * **$-** **$ '** **$*** **'** **$** / + 3 + F(, **++&&** 2

	6 (+
)	%
+ 9	7 , * , + + (, E (+ 3 , D + , (+ 3 ,
	6 (+ * E +

6 ++ + F(, 2

	B E (+
)	* 3 +
+ 9	* 3 +
	B E (+ * E +

% + 3 (, + (* + * *
, 3 (= F(3
, * O= =P % 3 (*(D
- (/ % * + + + C +
F(

% * E , + + , & C ,
* E + ,) C + , (+ 3 +
* E , * E % * E
F((+ (% * E +
3 , 3 + + , +
F(8 C* + * E *(3 + + 3
* C - . (/ 8 * E %
C , + , + % * E
, * ' F(

6 ,$ (++ , + , ++ +
3 , + + 6 & (
+ , + , + % , ((+ (, + ,
(++ , ((, + , (+ +
% (& , (+ , + , +
, * + + + (* (+
+

% (+ , C + - + , / 3
$ F(!" + * + ,
++ (* * 6 '
+ , (F((*
E, + (E, + + * 7 E, + +
* * 3 + * 7
(E, * * 3 +
* % , + + * + ,
((* + +
, *

6 (* + 7
C + C + +
(+ 8 (+ C + +
** + -C + /) C ,
D + + + +
** + , - + /

% * + $ F(

% C (! 3
$ + $ F(- + * F(+ + C /

% + (* 3 (2

	&
(	$
* E	
(+	
E (+	
, +	
	,
1	.
(	!" +
* +	
	) C* (+ D + , (+ C
	- + C /
	- (F((+ + C* /
	) C* (+ D + ,
C	
	T 3 + + U
(, + , * +	,$
C (	)
C	
* E	%
+	
+	# - O# #P/

C* C * * (* + 8
C* (+ + F(*
* + C 8 C* (+ *((
F(+ + (
+ +

8 F(E * * (C * , + +
+, + (+, * (* C
' 3 (* + * C * (+ 3 , ,
, C , + * C 3
* E * C

ChangeGC

2 ' &=%5 %

2 B8%@7 ?

2 A8 % 7A<5

5 2 .

% F(* % 3 (* E +3 (,
* + % 3 (+ *

* E 3 + 3 (* ' F(
C + + 3 + 3 (
F(C

% + , * 3 + + + 3 + + 8
+ (* * 3 +

CopyGC

2 ' &=%5 %

2 B8%@7 ?

5 2 .

% F(* * + % 3 (* E
, * % , C *(3 *
+ * + - . (/

SetDashes

2 ' &=%5 %

2 7 9 "

2 A8 % 7 9!

5 2

% F(+ + + + + 9
* - (/ ++ F(3
* + , +(3
% + * + 3 + S
++ + 5 * + C 7 *
*(D - (/ % + +
, * C + (+ (
F(9 (((*
* + , 1 (+ , F(
1 +

% (* (+ * + + *
8+ + * (+ (* *
F(+ * + D + 3 6
+ * (+ * (+ * 1 C
% * 1 C + + C C + ,

, #H + R#H + , GH + $$H + * C C 6
* 1 C C

6 * 3 * (+ + 3 +(+
+ + * * 3 +
+ + + +

6 * 3 C (+ + * 3 -
3 + ++ (* + + * /, *
C (+ + * 3 ,

6 * 3 * 3 + , , + +&&
(+ OC P + OCR+C R+ P
OC P (+ + + +
OC R+C R+ P (+ + + + 8 ++
3 * + + 7
(+ + + + + + +
, (+ (+ + + , + , (+

SetClipRectangles

2 ' &=%5 %

2 8=% "

2 A8 % 5 %7='A5

2 M(= =; =;, N

5 2 .

% F(* E + +
&((, + * + , %
+ 3 , 3 + + ,
+ F(% + + 3
% (+ (
, (+ + = * , 3
+ ((% % * E
+ '

8 E , + +,
+ (* % * 3 + 3 8
+ + 3 * . (F(+
+ 8 + ((+ + (*
+ = *
+ > =; ++ = +
, F(> +
=;, ++ =; F(3
> (+ 3 + > + >
C

FreeGC

2 ' &=%5 %

5 2

% F(+ , (89 + C +
+ C

ClearArea

* * 2 8=9&
2 8=% "
* 2 7 9 "
2 B&&A
5 2 .

% C + + 3 , + ,L + (
8 , + D + , (, +
, + , * (C 8 D + , (,
+ , * (8 , + , + + E (+ +,
* E + ($ + (, + , * + ,$
8 , + , E (+ % , + ,
+ 8 C ( ) * C (3
+ 3 +
E

8 . (+ $, + , F(

CopyArea

* * 2 9 7 7BA5
2 ' &=%5 %
2 8=% "
* 2 7 9 "
2 8=% "
5 2 .

% F(* + + , , +
+ + , % C + + 3
+ , L % + C ++ 3 + + , L
(% + , *(3
* + * + + + , - . (/

8 ((+ + 3 + E
(+ (+ (+ , +
+ (, (+
+ 3 + E 8
+ + , , + , , E (+ % +
+ + -, * E + ($ / ,
E (+ + + , + , +
C* C ( ) ! 3
+ + +

8 C ( ) (! 3 +
% ! 3 +

' * 2 (* E (, + , * + C (
C * E

CopyPlane

* * 2 9 7 7BA5
2 ' &=%5 %
2 8=% "
* 2 7 9 "
2 8=% "
2 7 9G$
5 2 .

% + , *(3 * + + , - .
(/ (+ 3 * + % *(3 C
+ 3 (*(\$ (\, +
+ , - (/ 5 3 C* * +
+ + , + , D + (* + (
(+0 E (+ C - (+ 3 ,
+ , E (+ 3 ,
/ + F(3 $ * + , * C (
* % ((+ (
, + 9 (
+

' * 2 (* E (+ E (+ (, + , * +
C (C * E

PolyPoint

* 2 9 7 7BA5
2 ' &=%5 %
2 M+ ' " N
2 A8 %)&8=%
5 2 .

% F(* (+ C , C
+ , % + , + +

% , 3 + , L % 3
3 (+ + + * +

' * 2 (* E (+ (, + , * + C
* E

PolyLine

* 2 9 7 7BA5

2 ' &=%5 %

2 M+ ' " N

2 A8 %)&8=%

5 2 .

% F(+ , , - O P O R P/ %
+ , + + % 1 *+ +
+ + + 1

6 3 C + , * 8 -D , + /
C + , *(* 8 , +
C + , ($- ,
+

% , 3 + , L % 3
3 (+ + + *+

, 3 3 + ," 1 3
D + * + 3 1 +
* * + + 4 , 3 * (+ +
- 3 1 / + + , + + ,

' * 2 (* E , + 1
(, + , * + C * E

' *+ + + * 2 (+ E (+
C + +

PolySegment

* 2 9 7 7BA5

2 ' &=%5 %

2 A8 % 5'@5=%

, 2

5'@5=%2 OC C$ $2 8=% "P

5 2 .

6 * F(+ , , OC P + OC$ $P %
+ , + + = 1 *+ + + 6
3 C + , * 8
C + , *(*

' * 2 (* E , + (
, + , * + C * E

' *+ + + * 2 (+ E (+
C + +

PolyRectangle

* 2 9 7 7BA5
2 ' &=%5 %
2 A8 % 5 %7='A5
5 2 .

% F(+ , (+ 3 $
- , + 2

[x,y] [x+width,y] [x+width,y+height] [x,y+height] [x,y]

% C + + 3 + , L +
+ (

% + , + + 6 3 C
+ , * 8 C + ,
*(*

' * 2 (* E , + 1
(, + , * + C * E

' * + + + * 2 (+ E (+
C + +

PolyArc

* 2 9 7 7BA5
2 ' &=%5 %
2 A8 % 7
5 2 .

% F(+ , (5 +
+ , % + + + "# ,
3 + (E, * + 3 + E, *
% + 3 L E *
+ + C +
$ 3 8 * (+ $ G"
+ (+ G" + % C + +
3 + , 6 + OC , $P
* 1 + * C OCR-,0$/ R- 0$/P +
+ 0 D C OC R- 0$/P
+ OCR, R- 0$/P + 3 C OCR-,0$/ P + OCR-,0$/ R P
% + S (+
+ +

6 , + , , + , + (+ (3
, , + (+
* 0 F(,0$ -, *
3 (/ , + + F(+
D ((+ (* * + + 4 , 3
* (+ (+ (- 3

/ + + , + + +
, +

% + * +
0 + *(
+ + , + + D
+ * * + + 4 , 3
, + + + * (
- 3 / + + +
, + + + 6
* (- 3 / +
+ + , + + , +
+ + - E, (E, / *
+

% 1 + * , +
0 1 , + +
D + *(+
1 * * + + 4 , 3 * (
+ + , + + , +
, + - E, (E, /
* 1 + 3 ,

6 + OC , $P *(+ 3
E , + + * - + +
* + / % , + C +
* + * - * (+ , /
, 2

```
skewed-angle = atan(tan(normal-angle) * w/h) + adjust
```

% E , + + * C + + - +
+ "#/ O $Z)8/ % (3 (O
)80$)80$P % +1(2

	*	O)80$/
)8	*	O)80$ -GZ)8/0$/
$Z)8	*	O-GZ)8/0$ $Z)8/

% + , + + 8 + ,
, , , 1 8
+ , , , 1
6 3 C + , * 8 , 1 +
, + D + C + , *
& , C + , *(
* , + + E, C + , *
C + + F(3 (E, C
C 1

B C D D 3 + ,

7 * (+ + + *

' * 2 (* E , + 1
(, + , * + C * E

' * + + + * 2 (+ E (+
C + +

FillPoly

* 2 9 7 7BA5
2 ' &=%5 %
2 M % " " N
2 M+ ' " N
2 A8 %)&8=%
5 2 .

% F(+ + % + (
* + + , = C
+ , *

% , 3 + , L % 3
3 (+ + + * +

% * * (+ 3 * 3 *
* * ((+
+

% " * + (,
3 C 8 E , % " 3 * * 3
* 8 % " +
((+ +

" * 3 + *
*+ 8 E ,
" * 3 * 8 " + 3 C
((+ +

' * 2 (* E ((, + , * + C
* E

' * + + + * 2 (+ E (+
C

PolyFillRectangle

* 2 9 7 7BA5
2 ' &=%5 %
2 A8 % 5 %7='A5
5 2 .

% F(+ ($, +
2

```
 [x,y] [x+width,y] [x+width,y+height] [x,y+height]
```

% C + + 3 + , L +
+ (

% + , + + 6 3 C
+ , * 8 C + ,
*(*

' * 2 (* E (, + , * + C
* E

' * + + + * 2 (+ E (+
C

PolyFillArc

* 2 9 7 7BA5
2 ' &=%5 %
2 A8 % 7
5 2 .

6 F(+ + +
+ + , * + + * +
6 * 1 + (+ 6
, * 1 + ,
(+

6 + OC , $P * 1 + * C
OCR-,0$/ R- 0$/P + + 0
D C OC R- 0$/P + OCR, R- 0$/P +
3 C OCR-,0$/ P + OCR-,0$/ R P % +
S (+ + +

% + + $ F(
*(+ +
* * + + 4 , 3 * + * (
+ - 3 / + +
, + + + , 6
* + * (+ + +
+ + , +

% + + + 6 3 C + , *
8 C + , *(*

' * 2 (* E * + (, + , * +
C * E

' * + + + * 2 (+ E (+
C

PutImage

```
  *          2 9 7 7BA5
   2 ' &=%5 %
       2  7 9!
 *                2  7 9 "
              2 8=% "
          2  7 9!
         2 M,            ;=              >            N
      2 A8 %  B>%5
 5    2                                  .

%     F(     *       *    ,                 + ,     %   +  C   +
+       +            3       + ,   L

8  ,            *     ( +     +    *(       -                          .              (  /   +
   *   *(        >   *   %       ( +  C       +         (
              *     +      E  ( +  C  +         (


6     ;=              +    >              +    *(  *       +        + ,    -
   .              (  /  6            ;=                *   *(          >   *   6
>                *   *(            X   *  +    +       3  +

%        + *(      D                    >              *   -          .              (  /  6
,            +    ;=              *       + *(            *         +
 3          3            (     *     -                                .              (  /  %
        +       3                  +       3   %     (   *
        *              +    %   , +     (*    +        , +
  (   *     + +         (+       +

'   *     2 (          *  E  ( ,  + , * +      C
    *  E

' * + +   +     *      2      ( +    E   ( +
```

GetImage

```
  *          2 9 7 7BA5
     2 8=% "
 *                2  7 9 "
              2  7 9G$
         2 M;=              >            N
 Q
 +   2  7 9!
 3  (  2  8 <7A89            %
 +   2 A8 %  B>%5
 5    2                    .

%      F(      (                  3                 + ,
 3     *    %   C   +       +            3        + ,   L         +
```

+ (8 ;= +
+ * E * + , *
* + 8 > +
+ * E * + D E
* + * ES C (* + % (+
+ + , + , , + + * +
* 6& @7% ((- (/ C
* 8 + , , + , 3 ((+ 8 + ,
C* 3 (%

8 + , C* 3 *(, +
, C* - . (/ 8 + , , + , ,
+ , *(3 , + *(,
3 , + , + , + , , (+ (3
+ , + , (+ + , + , -
. (/ = + , + , (+ + +
+ , F(8 , + , E E
(+ , + , (+
, + , S , (+ ((+ (+ +
7 (+ + (+ 3 +
+ + , + , % (* (+ +
(+

% F((* +
F(8 + + (+ * + (

PolyText8

* 2 9 7 7BA5
2 ' &=%5 %
2 8=% "
2 A8 % %5 %8%5@!
, 2 %5 %8%5@!2 %5 %5A%! 6&=%
%5 %5A%!2 O+ 2 8=%!
2 % 8='!P

5 2 .

% C + + 3 + , L +
- / 5 C * + (
7 * (+ + (+ (F(C
, * + C 7 C *
+ ++ C C
+ , S + , ++ + 5 *
+ + + ++ * E
+ ,

7 + 6&=% , * + *

8 + * 3 (* * 3 + ,

6 + + , $ * C + C % 8='! +
$ 3 (47 $B , 3 (D

' * 2 (* E (, + , * + C
* E

' * + + + * 2 (+ E (+
C

PolyText16

* 2 9 7 7BA5
2 ' &=%5 %
2 8=% "
2 A8 % %5 %8%5@ "
, 2 %5 %8%5@ "2 %5 %5A% " 6&=%
%5 %5A% "2 O+ 2 8=%!
2 % 8=' "P

5 2 .

% F(* $) 8 C $ - " / (+
6 + +, + C $ * C + C 3
, 47 $B " (* * + *
- 47 $B E *
/

ImageText8

* 2 9 7 7BA5
2 ' &=%5 %
2 8=% "
2 % 8='!

5 2 .

% C + + 3 + , L +
- / % +
, E (+ C + + + C ,
(+ C % (+ 2

```
[x, y - font-ascent]
```

, + 2

```
overall-width
```

+ 2

```
font-ascent + font-descent
```

% 3 , + + + + , (+ (+
: $) ! (+

% (+ + + + F(% 3
($ + 3

6 + +, $ * C +C % 8='! +
$ 3 (47 $B , 3 (D

' * 2 * E (+ E (+ (, +, * +
C * E

ImageText16

* 2 9 7 7BA5
2 ' &=%5 %
2 8=% "
2 % 8=' "
5 2 .

% F(* ') 8 C $ - " / (+
6 + +, +C $ * C +C 3
, 47 $B " (* * + *
- 47 $B E *
/

CreateColormap

2 &A& @7)
2 8 <7A89
* * 2 8=9&
2 M% N
5 2 .

% F(* +3 (,
, +, + + + *+, % 3 (*(
(+ - . (/ % 3 (
* (+ + $ +
6 $ +) , 3 + +
3 ((3 (3 (+ + +
6 $ +) *(+
% - . (/ 6 %
* + +

8 * +, % 3 (
+ (+ + 6 $ +
F((+ C 3 (* D = ,
= * 3 (+3 (6
F((+ C 3 (D + +* E
* E + (* E 3 (* +
* E +3 (4, 3
+,

FreeColormap

2 &A& @7)

5 2

% F(+ , (89 + * +
* 8 * + *
(+- (F(/ 8 * + +
* , + , - * ' /
* , + , + % + % &$ 3
+ % + + + + , + , ,
* %

% F(+ (*

CopyColormapAndFree

2 &A& @7)

5 2

% F(* * 3 (+ *
* + + *+, 8 *3 L
C * * , * , 3 (
+ + , +
* 3 (, * (+ + 8
* , + , - F(/
, * +, 3 (
+ * * + * + 8 * ,
+ , *3+
C + 3 + (
% + 3
+ , +

InstallColormap

2 &A& @7)

5 2

% F(*E * +* 7 , +,
+, * **+ + , (7 + +
+ * * * + (+ 3
* + (+ 3 + + C
F(+ *(* +

8 * + +* % &$ 3 +
3 , +, 3 * (8 ++ 3 *
+ (+ (F(% &$ 3
+ 3 , +, 3 * (

7 * (+* 3 ,+ + +
+ + F(+ % F(+ * @ ,

@ * + * + (%
F(+ * + , * C (*
++ + + S (+
E * @ * C
(* (+ F(+ * 3 + *
7 * ++ + F(+ , + *
3 + 3 * (*
F(+

8 + (* + - (F(+ /

UninstallColormap

2 &A& @7)

5 2

8 * F(+ - F(/
* 3 + * 7 + * * (+ + ++
* * * + (+ * +
(+ 3 + + C F(+ *(* +

8 * * (+ % &$ 3 + 3 ,
+ , 3 * (8 ++ 3 *
+ (+ (F(% &$ 3
+ 3 , + , 3 * (

ListInstalledColormaps

* * 2 8=9&

Q

* 2 A8 % &A& @7)

5 2

% F(((+ *
+ , + , % + * + C
+ F(+ - F(/

AllocColor

2 &A& @7)

2 7 9 "

Q

C 2 7 9G$

+ (2 7 9 "

5 2

% F(+ * + 'B
3 (3 + + +, 8 (C + 'B 3 ((
(+ @(F(* 3 'B 3 (+
* + , +

AllocNamedColor

2 &A& @7)

2 % 8='!

Q

C 2 7 9G$

C + C C (2 7 9 "

3 (+ 3 (3 ((2 7 9 "

5 2 %

% F(E (* + , + ,

* % + * % * (+ (8 &

A + +(+ , + * % C 'B 3 (

(3 (+ 3 (3 (3 ((

(+ *

AllocColorCells

2 &A& @7)

2 7 9 "

2 B&&A

Q

C * E 2 A8 % 7 9G$

5 2

% (* *(3 + (* *(

3 - (/ 8 +) F(+ C

+) * E (+ = * E , 3 ** ,

* E , C B & * E + C Z\$ ( )\

+ C +(+S + , F(

6 $ * E , 3 C S

, 3 C 8 (( ) +

* E & + ((, * +

$ + ((- , C

(+/ % 'B 3 (+ (+ +

AllocColorPlanes

2 &A& @7)

2 7 9 "

2 B&&A

Q

C 2 A8 % 7 9G$

+ * E * E (* E2 7 9G$

5 2

% (* *(3 + + + (*(
3 - (/ 8 + ' + B (
F(+ C (+ + * E 3 ' + B
3 8 (( ) * E , 3 ((
= * E , 3 ** , * E ,
C 6 * E , , + C (+
B & (* E , C Z\$ (R'RB\ + C
+(+S + , F(% 'B
3 (+ (+ + 8 * Z\$
(\ + + + Z\$ ('\ + + + Z
\$ (B\ + + (% (3
* C 3 (+ (%
C + * + + * E + +
+ + (+ +

FreeColors

2 &A& @7)
2 A8 % 7 9G$
2 7 9G$
5 2

% * E (+ 3 ** , C %
C +(+ & (* E , C %
F(C , + -(
% + / =
+ 3 +(C + * * (,
(+ (+ C + * +
(+ (+ + *
+ *(* *(* *
(+

7 + C + * + 3
* C +(7 + + C
3 + + C * 7 + + C
+ - (+ + /
* , + , , -(3 (
/ 8 * C ,
C +

StoreColors

2 &A& @7)
2 A8 % &A& 8%5@
, 2
&A& 8%5@2 O C 2 7 9G$
_ + + + + (2 B&&A
_ + (2 7 9 "P
5 2

% F(* + C % + + +
++ (+ + , * (+ (+ 8
* +* 3 **+

7 + C +, * - / +
3 * C +(7 + +
C 3 + +C * + + +
C (+ + + 8 * C
, C +

StoreNamedColor

2 &A& @7)
2 7 9G$
2 % 8='!
2 B&&A
5 2 %

% F(E (*+ , +,
* + + * % * (+(8 & A
+ +(+ , + * % +
*

QueryColors

2 &A& @7)
2 A8 % 7 9G$
Q
2 A8 % 'B
, 2
'B2 O + (2 7 9 "P
5 2

% F((+, 3 (+ *
+ C % 3 ((+ (+ (+ + 7
+ C 3 + +C * 8 * C
, C +

LookupColor

2 &A& @7)
2 % 8='!
Q
C + C C (2 7 9 "
3 (+ 3 (3 ((2 7 9 "
5 2 %

% F(E (* , +
, * + (C 3 (+ 3 (3 + +
+, , 3 (* % * (+ (
8 & A + + (+ , + *

CreateCursor

2 < &
2)8 @7)
2)8 @7) %
2 7 9 "
2 7 9 "
2 7 9 "
5 2 .

% F((+ + + , % (+
+ E (+ 'B 3 (*(+ 3 3
$ $ % (+ (+
(+ E (+ (+ B (+ * E -
+/ *(3 + - . (/ (3
% * E C* + (%
* E + , (C , + + + , * E
+ (C* + 8 * E
3 C (+ + % * E *(
* D (- . (/ % C + + +
3 (L + *(, (-
. (/

% * (* * + * + *

% C* + ** + (C *
* +

(F(+ , (* E C* (+ +
(% 3 * * * E C*

CreateGlyphCursor

2 < &
2 6&=%
2 6&=% %
2 7 9 "
2 7 9 "
2 7 9 "
5 2

% F(* C (+ * E *
+ * + % (*(+ +

(+ * E 3 * E *(+ + * E
- (/ % * E + %
(+* E- + +/ + + ++
% (+* E + 3 * (+ C *
+ * 3 (+
C 8 * E 3 C (+ + = (
+* E 79" 47 $B 6 $ * C "
3 ((+ *+, * + $

% * (* *+ * + *

% + **+ (C *
*+

FreeCursor

2 < &
5 2

% F(+ , (89 + (%
(, +, (

RecolorCursor

2 < &
2 79"
2 79"
5 2

% F((8 (+ +
3 **+

QueryBestSize

2M) N
* 2977BA5
* 2 79"
Q
,+ 2 79"
5 2 .

% F((D (* D 6
D (+ + 6) D
+ 6 D +

6 +, + + + 6) +
+, + + , +, ++ 7

+ $, + , (+ + ,) - .
(/

QueryExtension

2 % 8='!

Q

2 B&&A

* 1 + 2 7 9!

3 2 7 9!

2 7 9!

% F(+ * * + C 8 * 1 +
C (+ & , D (+ 7 *
+ + F(* C 8 C
3 3 ++ 3 3 + (+ & , D
(+ % * 3 C 8 C
3 3 ++ + + (+ & , D
(+ % * ++ + C

% C * (+ (8 & A + + (+ ,
*

ListExtensions

Q

* 2 A8 % % 8='!

% F((C (+ 3

SetModifierMapping

2 7 9!

2 A8 % ?5> &95

Q

(2 M **, $** N

5 2

% F(E + - / E (+ * +
% (* E + *(!ZE + * + - **- '**
(/ % E + + 3 + + ,
E + * + * % + * + **& - 6**
. 0 . 1 . 2 . 3 + **. 4** + & D E +
3 ((+, SD 3 (+ 7 D E +
*(+ * E + + * C E +
(- (/ % + E + , + *
8 D 3 (+ (+ * +

+ + + * + , , D & , * + ,
, 3 E + + ,

7 3 * , * + + - C *
E + (+, (
+ + E *(E * + (+/ %
(* (3 + + * +
+

8 , D E + + * + + * (
+ + + - (,/ E * + + ,
(, $ + * + +

% F(. '% &$ 3 (

GetModifierMapping

Q
E + * + 2 7 9!
E + 2 A8 % ?5> &95

% F((E + E (+ * + % (*
E + !ZE + * + % E + + 3 + +
, E + * + * %
+ * + & - 6 . 0 . 1 . 2 . 3 +
. 4 + % E + * + 3 (3 S
D (+ ((+ * , 8 D 3 (
3 (+ * + + + % +
E + , 3

ChangeKeyboardMapping

2 ?5> &95
2 7 9!
2 A8 % ?5> >@
5 2

% F(+ * + (* E + ,
+ E + % * E + (+ * + (
+ % (* * E * *(*(E *
E + - - ' (/ % E + *(
F(* E + (+ (- (/
+2

```
first-keycode + (keysyms-length / keysyms-per-keycode) - 1
```

*(F(* C E + (+ (-
(/ ?5> >@ (* = - (* D / E + ?
+ C - (* D / 2

```
(K - first-keycode) * keysyms-per-keycode + N
```

E * % E * E +
(+ + + * 7 ?5> >@ 3 (= *
(+ (+ ((+ * + 3 +(E + 8
= * 3 E +

% F(. '% &$ 3

% F(* 3 * S * +
+ + +, - H /

GetKeyboardMapping

2 ?5> &95
2 7 9!
Q
E * E + 2 7 9!
E * 2 A8 % ?5> >@
5 2

% F((* + (* E +
, + E + % E + *(F(*
E + (+ (- (/ +2

```
first-keycode + count - 1
```

*(F(* C E + (+ (-
(/ % (* * E * 2

```
count * keysyms-per-keycode
```

+ ?5> >@ (* = - (* D / E + ? + C - (
* D / 2

```
(K - first-keycode) * keysyms-per-keycode + N
```

E * % E * E + 3 (3
(F(+ * 7 ?5> >@ 3 (= *
(+ ((+ * + 3 +(E +

ChangeKeyboardControl

2 B8%@7 ?
2 A8 % 7A<5
5 2 .

% F(3 (E + % 3 (* E +3 (
, + % 3 (2

	)$
E E	8=%!
	8=%!
	8=% "
+(	8=% "
+	7 9!
+ * +	M+ +&&N
E	?5> &95
(* +	M+ +&& & N

% E E 3 (* E E , - / + - (+/
(3 + (& 3 3 (

% 3 (* , - / + - (+/
(3 + (& 3 3 (

% - + 4D/
+ (& 3 3 (

% +(+(- + * + /
+ (& 3 3 (

8 + * + + + + A59 +
8 + * + + A59 +
7 * G$ A59 (* + * (+ = + +
A59 + + 8 . + +, (+ * +

8 (* + + E + (* +
E + 8 (* + +
(* + E + + , (
E 8 . E +, ((
* + 5 E + 3 +(* + , (+ (
+ + (* + 8 ++ * + ,
((+ + + + (* +
* + + E (+ + 3 +((* +
* + +&& E (+ (7 (E
# $ + # $* 3 E (+ * +
+ E (+ (
E

7 + , (+ E +
+ , E +

% + , 3 + + + 3 + + 8
+ (* 3 +

GetKeyboardControl

Q
E E 2 7 9!
2 7 9!
2 7 9 "
+(2 7 9 "
+ * E2 7 9G$
(2 M + +&&N
(2 A8 % 7 9!

% F(((3 (E + 6 A59
+ * E + A59 +
+ * E + A59 % (3 S
+ (+ + E % 3
+ G$ B = - * / E != != R
, E !=

Bell

2 8=%!
5 2

% F(E + 3 (* 3 3 (*
E +) * (3 -
(/ % 3 (* , (,
3 2

```
base - [(base * percent) / 100] + percent
```

3 2

```
base + [(base * percent) / 100]
```

SetPointerMapping

2 A8 % 7 9!
Q
(2 M , $ N
5 2

% F(* 5 * + C +
* % *(* . ' , (+
(- (/ % + C ((* +
* + 3 (*

7D * + (5 * + 3 ((*
((, * 3 * D 3 (-
(/

8 (+ + , (
, $ + * +

% F(. '% &$ 3 (

GetPointerMapping

Q
* 2 A8 % 7 9!

% F(((* 5 *
+ C + * % + (*
(

% * * + * 2 * O P[

ChangePointerControl

2 B&&A

2 8=% "

2 8=% "

5 2

% F(+ , * 3 % *(
* 3 * C + 6 C * G0 *
* 3 * * % (+ +
3 7 E * 3 * +
(* C + * (+ +
3 (+ (& 3 3 (
+ D 3 (+ *

GetPointerControl

Q
(* + * 2 7 9 "
+2 7 9 "

% F(((+ +

SetScreenSaver

2 8=% "
2 M= % & N
* 2 M= % & N

5 2

% * (+ 3 + + S 3 (
+ (& 3 3 (8 * (3 (D

3 + + - (3 + 3 + 3 +/ 8
* (3 (D 3 + & 3 +
(* E + + * (+
3 3 + 6 E + + +, (
3 + E , * E & , C (
, + + , (+ C (3
+ 3 + + 3 + (
& , + + 3
3 + 7 C E + (C " ,
* + * 3 + 3 + + +

8 3 + + 3 * + * +
3 3 (, + (+ , D
+ (+ * + 5C * ,
(+ * * + * 3 * (
+ , , + , E (+ + *
+ +

GetScreenSaver

Q
* (3 2 7 9 "
E 2 M = % N
, C (2 M = % N

% F(((3 3 (

ForceScreenSaver

2 M " * N
5 2

8 * + " + 3 (+ 3 + 3
3 + - 3 3 + + , * (3 (D /
8 * + * + 3 (+ 3
+ 3 + - , 3 +/ + 3 *
+ 3 (+ 1(3 +

ChangeHosts

2 M N
2 4& %
5 2

% F(++ * 3 + *
* * + + *
3 , + *(
*(3 + * 3 + +
* + 3 , (

% *(+ * 3 +0 3 +
* 3 + + * + C (F(-
(/

7 ((+ *
3 + (+

% , ++ * + + 7 3 F(+ (
* + * (* + < ((+ *
* ++ * * ++ , (+ *
(

6 8 * ++ *((% ++
+ + 8) + S 3 * (* , ++
% 8 * (8) 3 # ++

6 8 " * ++ *(C % ++
+ + 8) + S 3 * (* , ++
% 8 " * (8) 3 " ++

6 95 * 3 * (* , ++
7) 8 ++ , 2
+ (* + + *
, + (* , +
* C

6 * ++ *(, % (* ,
++ + ((* , + %
3 * (* , ++

6 3 8 + * ++ * ("HHGH
% ++ , 7 88 +
, 3 (% ++ + +
++ 3 (7++ + C +
3 (, + 3 & 8* * , , ++
* * * (F(C , &
3 *

< ++ 4 F(+ + 8 ((
, (F(++ F(* (
* + + * + ++ , E ++
, 8)3" E ++ +3 (8 (*
(F(3 + (3 (
* *((* 3 * 8 + * (* (
(+ + (E
** + +

ListHosts

Q
* + 2 M ! N
2 A8 % 4& %

% F((+ , (
((+ + +

5 4& % ++ + *((

SetAccessControl

2 M! N

5 2

% F(+ (
(

% *(+ * 3 +0 3 +
* 3 + + * + C (F(-
(/

SetCloseDownMode

2 M $ * *) $ N

5 2

% F(+ , , L (
7 $ * + % * + , * + +
+

KillClient

2 7 9G$) $

5 2

8 3 + (+ # + ,
+ (8 + * + *
*) $ * + L (+ + -
/ 8) $ + (3 *
+ *) $ + +

NoOperation

% F((* + ((F(+ ,
F(*((% +
F((+ 3

% F((+ * *(* (* ++ ,
+ 3 F("#
(+

Chapter 10. Connection Close

Chapter 11. Events

(+, * , +, + 3
+ * +,
E 3 3 8 * 3 (
C 3 + (* 3 3
+ * (3 * %
F(3 , , (* 2

'	
3 , +,	53 , +,
3 * E	L + 3 3 , +,
+ +E ++	$
, 3	) + , + 3 , +, ,
	%
(	%

% * + (* ,
(+ (' + ' "
(+ *+ 3

Input Device events

#$
#$*
,
, *
. % &$
2 8=9&
2 8=9& %
2 B&&A
2 8=% "
2 T ,U
2 5% ?5>B<%@7 ?
2 %8@5 %7@)

% 3 + , E (
, *3 % *
+3 3 D = #$ +
#$* + E 3 * + *+ %
(3 , +, % , +, 3
+, + 3 , +, % 3 , +, (+
, (, +, + E (, +, ,
+ 3 - 3++ 3 , +,

3 (+ 3 + * E/
% (, + , (+ *+ + 3 +
E + 3 *+ + (, + ,

% , + , (, + , + C +
+ 3 L * 3 53
3 , + , 8 3 , + , * 3 C +
3 + 3 3 , + ,L & ,
3 C + 3 D 8 (, + , 3 , + ,
+ + 3 , + , - /
(, + , & , % % * 3
(+ * + E 1(3 % + *
3 , 3 2

!"		
# $	# $*	?5> &95
,	, *	B<%%&=
. % &$		M% / N

. % &$ 3 + , * + +
, + , % (* 3 (+ (
* 3 (+ 3 , * 3 +
*
. 3 3 + +
(B * (, ?0 4@. + .
% &$ 3 , 3 + , * + (
+ B , . . % &$ 3 , 3 +
, (+ % 3 , . %
&$ + + 8 . / + 3
+ . % &$ 3 -, + / /
3 , + , (E (3
3 , + , (: $. !" F(

Pointer Window events

! % &$
- " % &$
2 8=9&
2 8=9& %
2 B&&A
2 8=% "
2 M% (' N
2 M & % % N
2 B&&A
2 5% ?5>B<%@7 ?
2 %8@5 %7@)

8 * , + , (+
, + , ! % &$ + - " % &$ 3 + +

. % &$ 3 & ! , + , 3
! % &$ 3 + - " 3 - " % &$
3 % + 3 ,
% , + , +
C + + 3 L *
3 53 3 , + , 8 3 , + , *
3 C + 3 + 3 3
, + ,L & , 3 C + 3 D 8 - " % &$ 3
+ 3 , + ,
+ * + & , % 6 ! % &$
3 + 3 , + ,
+ * + & , % 8 3 , + ,
(, + , (, + , ( ) & ,
(

= * * 3 3 * + %) (+ * 3 ,
3 3 * + + (+ * 3 , + 3
3 * + ('

7 ! % &$ + - " % &$ 3 (+
+ 3 (+ - (% &$.
% &$ & ' % &$ " $% &$ % &$ / (+
! % &$ + - " % &$ 3 , + $% &$
+ ! 3 +

= * 3 + , 2

* 3 *, + , 7 , + , B + 7 B2

J - " % &$, + + 7

J - " % &$, + + , + , , 7 + B
C (3 - + /

J ! % &$, + & + B

* 3 *, + , 7 , + , B + B 72

J - " % &$, + & + 7

J ! % &$, + + , + , , 7 + B
C (3 - + /

J ! % &$, + + B

* 3 *, + , 7 , + , B + , + ,
** 2

J - " % &$, + % + 7

J - " % &$, + % + , + , ,
7 + C (3 - + /

J ! % &$, + % + , + , ,
+ B C (3 - + /

J ! % &$, + % + B

* 3 *, +, 7 , +, B + 2

J - " % &$, + % + 7

J 8 7 , +, - " % &$, + % +
, +, 3 7 (+ (+ - + /

J 8 B , +, ! % &$, + % +
, +, * BL +, ((+ B - + /

J ! % &$, + % + B

3 -(, , +,
+ (, 3 3 / '
, +, +) , +, 2

J ! % &$ + - " % &$ 3 , *+ +- %
3 / , (++ , * ( )
* ' 4, 3 + , +
(+ + 3

+ 3 -((, *
3 + 3 / ' , +, +)
, +, 2

J ! % &$ + - " % &$ 3 , *+ (' +-
% 3 / , (++ , * * '
( ) 4, 3 + , + (
(+ + 3

Input Focus events

+

2 8=9&

2 M% (' N

2 M & % %

* % N

% 3 +, ((+ +
' , +, 53 +
, E + + 3 *+ % 53 +
, E + + 3 *+ 53
+, E + 3 3 *+ + 3 +
, E + + 3 3 *+ ('

7 + 3 (+ , +, (* + (
% &$ 3 (+ + , + ! %
&$ - " % &$ $% &$ + ! 3 +

% + 3 + , 2

(*3 *, +, 7 , +, B 7 B +
, +,)2

J + , + + 7

J + , + + , + , 7 + B
C (3 - + /

J , + & + B

J 8) B ( ) 7 7 7
, + + , + , , B + , + (+
) - + /

(* 3 *, + , 7 , + , B B 7 +
, + ,)2

J 8) 7 ( ) B B +
, + + , + , *) (((+
7 - + /

J + , + & + 7

J , + + , + , 7 + B C
(3 - + /

J , + + B

(* 3 *, + , 7 , + , B , + , **
+ , + ,)2

J 8) 7 + , + + , + ,
*) (((+ 7 - + /

J + , + % + 7

J + , + % + , + , ,
7 + C (3 - + /

J , + % + , + , ,
+ B C (3 - + /

J , + % + B

J 8) B , + + , + ,
, B + , + (+) - + /

(* 3 *, + , 7 , + , B + +
, + ,)2

J 8) 7 + , + + , + ,
*) (((+ 7 - + /

J + , + % + 7

J 8 7 , + , + , + % +
, + , 3 7 (+ (+ - + /

J 8 B , + , , + % +
, + , * BL + , ((+ B - + /

J , + % + B

J 8) B , + + , + ,
, B + , + (+) - + /

(* 3 * , + , 7 * - % / +
, + ,)2

J 8) 7 + , + + , + ,
*) (((+ 7 - + /

J + , + % + 7

J 8 7 , + , + , + % +
, + , 3 7 (+ (+ - + /

J , + * - % / + , + ,

J 8 , (* , + +
, + , *)L + , + (+) - + /

(* 3 * * - % / , + , 7 +
, + ,)2

J 8 + (* + , + +
, + , *) (+ (+)L - + /

J + , + * - % / + , + ,

J 8 7 , + , , + % +
, + , * 7L + , ((+ 7 - + /

J , + % + 7

J 8) 7 , + + , + ,
, 7 + , + (+) - + /

(* 3 * * % - 3 3 / +
, + ,)2

J 8 + (* + , + +
, + , *) (+ (+)L - + /

J + , + * - % / + , + ,

J , + % - * / + , + ,

J 8 , (* , + +
, + , *)L + , + (+) - + /

E + 3 - ((# $ 3
3 / ' , + , + 6 (
(2

J + + 3 , * + + - %
3 / (, * 6 '

E + + 3 -((#$*
3 + 3 / ' , +, + 6
((2

J + + 3 , *+ (' +- %
3/ (, *' 6

KeymapNotify

#$ % &$
2 A8 % 7 9!

% 3 (3 + + : $#$ % 3 +
#$, +, + + **+
3 ! % &$ +

Expose

!
* * 2 8=9&
* 2 7 9"
2 7 9"

% 3 + ! , +, 8
+, 3 + 3 , +, +
3 3 , + 3 - , /*
E , +, , +, 3 , (3
- , / , +,L E ($
. % + * + +
! 3 +

6 3 (C (3 3 3 , +,
(+ + ((8 (D * !
3 , +, , 8 (D * *
! 3 , +, , - + * /

% C + + 3 , +,L + (
% ,+ + C

! 3 3 + + $, +,

7 ! 3 (+ +
3 (+ - C* (% &$. % &$
&' % &$ " $% &$ % &$ / 7 ! 3 3 ,
+, + $% &$ 3 , +, (
F(+ ! 3 , +, + $
3 , +, % + ! 3 , +
! % &$ + - " % &$ 3 +

GraphicsExposure

!

* 2 9 7 7BA5

* 2 7 9"

2 7 9"

2 7 9!

2 7 9"

% 3 + (C , C (
+ + + , + (+ * (+ +(
(+ ((+ (7 C + 3
F((+ + ((8 (D
* ! 3 , + , , 8 (D
* * ! 3 , + , , - +
* /

% C + + 3 + , L + (
% , + + C

% * 1 + * + + F((+ 6
* 1 + , $ $ + * + ,
D

NoExposure

%!

* 2 9 7 7BA5

2 7 9!

+ 7 9"

% 3 + (C , C (
+ + + , F(* +(
! 3 + +(% + , +
(+ F(

% * 1 + * + + F((+ 6
* 1 + , $ $ + * +
, D

VisibilityNotify

$% &$

* * 2 8=9&

2 M($+ $+ N

% 3 + $ ' , + , 8
, , + , (+ , + ,L (,
+ , , + , * ((+ 3 ,
3 , + * ((+ 3 , (
+ , + , * 3 , + * ((+
* 3 , + * (+ * 3 , 3 , +

(+ 3 , $+ + , + ,
* 3 , + * ((+ * 3 , +
(+ * 3 , 3 , + ((+ 3 ,
$+ +

$% && 3 3 + + $, + ,

7 $% && 3 (+ +
3 (+ - C * (% && . % &&
&' % && '' $% && % && / 7 $% && 3
3 , + , + ! 3 , + , (
F(+ $% && 3 , + , +
! 3 , + , % + $% && 3 ,
+ ! % && + - '' % && 3 +

CreateNotify

% &&
* * 2 8=9&
2 8=% "
* * 2 7 9 "
2 B&&A

% 3 + % && +
+ , , + , + % (*
F(

DestroyNotify

$% &&
* * 2 8=9&

% 3 + % && , + , +
% && 8 + , ,
+ , + + % 3 , + , , 3 , + +
, + , , + , + +

% + $% && 3 (3 , + ,
$% && + , + , +
, + , % + * + (
, +

UnmapNotify

(% &&
* * 2 8=9&
2 B&&A

% 3 + % && , + , +
% && 8 + , ,
+ , * * + (* + % 3 , + , ,

3 , + + , + , , + , (* + %
* ( ) 3 , + (, + ,L
D + , , + , + , 3 (

MapNotify

. % &$

* * 2 8=9&

2 B&&A

% 3 + **% &$** , + , +
% &$ 8 + , ,
+ , * (* + * + % 3 , + , ,
3 , + + , + , , + , * + % 3
+ + * , + ,L (

MapRequest

. * 9

* * 2 8=9&

% 3 + *
+ + , . F((+ (* + , + ,
, 3 + + (

ReparentNotify

*** % &$**

* * 2 8=9&

2 8=% "

2 B&&A

% 3 + **% &$** +
, + **% &$** , + , 8
+ , , + , + % 3 , + , ,
3 , + % , + , , + , + %
, % C + + 3 , L
+ ((, + , %
3 + + * , + ,L (

ConfigureNotify

& ' % &$

* * 2 8=9&

2 8=% "

* * 2 7 9 "

2 8=9& **%**

2 B&&A

% 3 + % &$, + , +
% &$ 8 + ,
&' F((, + , % 3
, + , , 3 , + + , + , , + ,
+ % C + + 3 , L +
((, + , % , + +
+ D (+ + 8 3 %
, + , * E , & , ,
+ , ** + + % 3 + + *
, + ,L (

GravityNotify

" $% &$
* * 2 8=9&
2 8=% "

% 3 + % &$ +
% &$, + , 8 + , , + ,
* 3 + (D % 3 , + , ,
3 , + + , + , , + , * 3 + % C +
+ 3 , L +
((, + ,

ResizeRequest

* 5 * 9
* * 2 8=9&
* 2 7 9 "

% 3 + * 5 * , + , +
+ , &' F(* , + ,
* D , + , % , + + F(+
+ D (+ +

ConfigureRequest

&' * 9
* * 2 8=9&
2 8=% "
* * 2 7 9 "
2 8=9& %
2 M " ,) & , & + N
2 B8%@7 ?

% 3 + *
+ + , &' F((+ , + ,
* % 3 (* E + , * , +

F(% 3 (* E + + 3 (+ 3
F(% * 3 (+ * (*
, + , C + E * + , + %
+ " - 3 / 3 F(

CirculateNotify

% &$
* * 2 8=9&
2 M) , N

% 3 + % &$, + , +
% &$ 8 + ,
, + , (E + * F(% 3
, + , , 3 , + + , + , , + ,
E + 8) , + , , & ,
,

CirculateRequest

* 9
* * 2 8=9&
2 M) , N

% 3 + *
+ + , F((+ +
, + , (+ E + % , + , , + ,
E + + , , E + (+

PropertyNotify

$% &$
* * 2 8=9&
2 7%&@
2 M% N
2 %8@5 %7@)

% 3 + $ ' , + , +
+ , % , , + , + (
' $ * 3 , ++ D + (
' $ + , , + +
(' $ * 8 + ,
, , + , + + (F($
$ % * * + 3 * , , +

SelectionClear

```
*       2  8=9&
            2 7%&@
      2 %8@5 %7@)

%    3          +       (      ,              +         + ,
  , ,          +    +   *                                  +                  %    *   *
            *     + +              %    ,     (*        , + ,
   ,        +      (      ,                                  +                  F(
```

SelectionRequest

```
      * 9
*       2  8=9&
            2 7%&@
        2 7%&@
            2 7%&@      %
             2  8=9&
      2 %8@5 %7@)              )

%    3          +       ,              +         + ,
  (          "                    F(    %    ,     (*        , + ,     ,
     +                    +                  F(    %    *       (*
      "                    F(

%    ,     ( +   3              +          +          +   +
        %   &$            E       F(     7   *                (
      3        &     + +                    "    #    #         #        $
```

SelectionNotify

```
      %   &$
             2  8=9&
                    2 7%&@
            2 7%&@      %
      2 %8@5 %7@)              )

%    3          +        3                                          "                    F(
,            ,                          ,        ( +
     +       ,   (                        !"            %    ,              ( +    +
   3        F(          ,                 3   +   +    +
          ,            3       ( +          * + -  +    + ,
            %      /
```

ColormapNotify

% &$
* * 2 8=9&
2 &A& @7) %
* 2 B&&A
2 M (N

% 3 + ' , + , 8
+ , 3 ( ) , , * (, + ,
+ + + , 3 (, , * , + ,
+ (+ 8 + , *
(+

MappingNotify

. '% &$
2 M. & #$ N
2 7 9!

% 3 % * * C +
3 % + + E + (+2 . & (
(. & . ' #$ (('#$.
' + ((. ' 8 + #$
E + + (+ + E +

ClientMessage

. '
* * 2 8=9&
2 7%&@
2 M! " G$N
2 A8 % 8=%! A8 % 8=% " A8 % 8=%G$

% 3 + (!" % ,
+ + 3 S 3
+ % * , + (+ 3 , +
! " G$ F(3
, % + , $! 3 ("
3 (H G$ 3 (((* * * E (
3 (

Chapter 12. Flow Control and Concurrency

3 3 , 3 * 3
+ * - (, , (+ E *((
3 / % 3 F(+ (*
F(* 6 3 3
E , + * ((+ (+ E + - 3
+ / , , , (+ E 6 (
((+ (+ + E + (+ + E (E
(3 (*
+ (* F(, (3 + E
+ 3

3 * * + , (3
*(+ 3 +(F(C (+ * * +
+ F(* 3 *(C (+ + 3 + -
C (+ (+ 3 +(* / % C (
F((+ 3 + (* + +
+ F((F(+ 3 4 , 3 + (+
(* + 3 8 ++
(*(3 - C * 3
* / *(3 + F((F(+ 3 + 3 ,
(+ F(6 F(* 3 3
+ + (+ C (F(*(

Appendix A. KEYSYM Encoding

?5> >@ 3 (G$ + * E
E + % * , D , 3 $
(* 6 3 ?5> >@ 3 (3 , + (
2

J B * - D + *
3 $ 3 3 (/

J B $ C *

J B G C *

J B #

% C ?5> >@ 3 (

Special KEYSYMs

% , 3 (2 = * + + * % (+ +
* - H ? + /

,$ 0	,$ 1	,$ 2	,$ 3	/ A "	%
				VC	= *
	$HH	$HH	$HH	VC 666666	+ *

Latin-1 KEYSYMs

% A ?5> >@ (VC $ VC 5 + VC 7 V 66
+ 8 & "#" 0 < + <R $ <R 5 + <R 7
<R 66 3

Unicode KEYSYMs

% (VC VC 6666 + 8 & "#" 0
< + <R <R 6666 3 % (* 3 (
< + ?5> >@ < + + (
VC 8 E, + * (+
< + ?5> >@ + A ?5> >@
, C

9 + E , C + +
+ 6(?5> >@ + < + ?5> >@ +
F(3 * E + (,
* 3 < + - (, + ,
(((/ 6(?5> >@ (+ (+ +
< + ?5> >@ + + + *

Function KEYSYMs

% E * + + * + +
8 + + , (* +
- ((E / 3 + (+ + + E
6(?5> >@ 3 D 3 (+ $ B G + (,
3 ! , , # + + 3 +((E

,$ 2	,$ 3
$HH	? +
$H#	? + - ?B/ 5C
$HG	G$

* E E + + * 3 + +,
E (+ * ((
E * 3 (E 3 * * +
, + + (C , ,
(+ 3 (+ % * E +
, * ((+ * E 3 , + *
, (- < 3 (' * /

% , , E (, + ?5> >@ (, +2

J % 5 3

J % **

% 5 3 ?5> >@ 3 (F(E 3 %
3 E (E 3 E + 6 C *
* E + (E 6 (6 +
*)6 ( )6 % , (+ + E (+ 5 3
A E , A E , (+ + * A E , + *
(, * , (%
(9 95A 9 * 3 + % 5 3
* E + + , (+ ++ + ?5> >@
2 + C * C , +

% ** (E
(* E + + E * ?5> >@ 6 C *
9 95A + 9 * + ?5> >@ + (*
?5> >@ -(3 + + / (+
(F(E , (+ + + + 5 3 + + + ,
E * + + ?5> >@ , (* 3 ++
(8 * + (* * (1(+ * F(+
(, (E + * * 3 1(* E
?5> >@ + + + (, 3 (+ * +
?5> >@

7 (* **
+ (* E , 4 3 9
(* + ?5> >@ , * *
+ (+ C + , + , E <
+ ** , E +
3 + ?5> >@ ((C + +

+ 3 * (,

% ? + * (** (E E
+ (* E + * +(
* (+ E * E + (+ (+
(3 + (* + , *

#!= =. "	%		
VC66 !	B7 ?)7 5 B7 ?)7 5 B7 ? 47	?	+
VC66	%7B	?	+
VC66 7	A8=56559 A6	?	+
VC66 B	A57	?	+
VC66 9	5%< = 5=%5	?	+
VC66 G	)7< 5 4&A9	?	+
VC66 #	&AA A& ?	?	+
VC66 H	> 5I > %5@ 5I<5 %	?	+
VC66 B	5 7)5	?	+
VC66$	@<A%8 ?5> 47 7 %5) 567 5	?	+
VC66$	?7=K8 ?7=K8 &= 5 %	?	+
VC66$$	@<45=?7=	?	+
VC66$G	45=?7= @&95	?	+
VC66$#	&@7K8	?	+
VC66$H	48 7'7=7	?	+
VC66$"	?7%7?7=7	?	+
VC66$	48 7'7=70?7%7?7=7 %&"A5	?	+
VC66$!	X5=?7?<	?	+
VC66$	47=?7?<	?	+
VC66$7	X5=?7?<047=?7?< %&"A5	?	+
VC66$B	%&< &?<	?	+
VC66$	@7 >&	?	+
VC66$9	?7=7 A& ?	?	+
VC66$5	?7=7 486%	?	+
VC66$6	58 < 486%	?	+
VC66G	58 < %&"A5	?	+
VC66G	47='<A %7 %0 %&) -%&"A5/	?	+
VC66G$	47='<A %7 %	?	+
VC66GG	47='<A 5=9 5='A8 4 %7 %	?	+
VC66G#	%7 % 47='<A047=K7 &= 5 8&=	?	+
VC66GH	47='<A K7@& @&95	?	+
VC66G"	47='<A &@7K7 @&95	?	+
VC66G	47='<A &95 8=)<%	?	+

#!= =. ''	%		
VC66G!	47='<A K5&=K7 @&95	?	+
VC66G	47='<A B7=K7 @&95	?	+
VC66G7	47='<A) 547=K7 &= 5 8&=	?	+
VC66GB	47='<A)& %47=K7 &= 5 8&=	?	+
VC66G	47='<A 8='A5 7=9897%5	?	+
VC66G9	47='<A @<A%8)A5 7=9897%5	?	+
VC66G5	47='<A) 5 8&< 7=9897%5	?	+
VC66G6	47='<A)5 87A >@B&A	?	+
VC66H	4&@5	?	+
VC66H	A56% @& 5 A56% A56% 7 &	?	+
VC66H$	<) @& 5 <) <) 7 &	?	+
VC66HG	8'4% @& 5 8'4% 8'4% 7 &	?	+
VC66H#	9& = @& 5 9& = 9& = 7 &	?	+
VC66HH	) 8&) 5 8&<)7'5 <)	?	+
VC66H"	=5 %)7'5 9& =	?	+
VC66H	5=9 5&A	?	+
VC66H!	B5'8= B&A	?	+
VC66"	5A5 % @7 ?	?	+
VC66"	) 8=%	?	+
VC66"$	5 5 <%5 <= 9&	?	+
VC66"G	8= 5 % 8= 5 % 45 5	?	+
VC66"H	<=9& &&)	?	+
VC66""	59& 7'78=	?	+
VC66"	@5=<	?	+
VC66"!	68=9 57 4	?	+
VC66"	7= 5A %&) 7B& % 5 8%	?	+
VC66"7	45A)	?	+
VC66"B	B 57?	?	+
VC66 5	@&95 8% 4 8)% 8% 4 47 7 %5 5% 8% 4	?	+
VC66 6	=<@ A& ?	?	+
VC66!	?5>)79)7 5	?	+
VC66!	?5>)79 %7B	?	+
VC66!9	?5>)79 5=%5	?	+
VC66	?5>)79 6)6 7	?	+
VC66 $	?5>)79 6$)6$ B	?	+
VC66 G	?5>)79 6G)6G	?	+
VC66 #	?5>)79 6#)6# 9	?	+

#!= =. ''	%		
VC66 H	?5>)79 4&@5	?	+
VC66 "	?5>)79 A56%	?	+
VC66	?5>)79 <)	?	+
VC66 !	?5>)79 8'4%	?	+
VC66	?5>)79 9& =	?	+
VC66 7	?5>)79) 8&)7'5 <)	?	+
VC66 B	?5>)79 =5 %)7'5 9& =	?	+
VC66	?5>)79 5=9	?	+
VC66 9	?5>)79 B5'8=	?	+
VC66 5	?5>)79 8= 5 %	?	+
VC66 6	?5>)79 95A5%5	?	+
VC6677	?5>)79 @<A%8)A8 7%8&= 8'= 7 %5 8 ?	?	+
VC667B	?5>)79)A< 8'=	?	+
VC667	?5>)79 5)7 7%& &@@7	?	+
VC6679	?5>)79 @8=< 8'= 4>)45=	?	+
VC6675	?5>)79 95 8@7A)&8=% 6<AA %&)	?	+
VC6676	?5>)79 98 8 8&= 8'= &A89<	?	+
VC66B	?5>)79 98'8% X5 &	?	+
VC66B	?5>)79 98'8% &=5	?	+
VC66B$	?5>)79 98'8% % &	?	+
VC66BG	?5>)79 98'8% %4 55	?	+
VC66B#	?5>)79 98'8% 6&<	?	+
VC66BH	?5>)79 98'8% 68 5	?	+
VC66B"	?5>)79 98'8% 8	?	+
VC66B	?5>)79 98'8% 5 5=	?	+
VC66B!	?5>)79 98'8% 58'4%	?	+
VC66B	?5>)79 98'8% =8=5	?	+
VC66B9	?5>)79 5I<7A 8'=	?	+
VC66B5	6	?	+
VC66B6	6$	?	+
VC66	6G	?	+
VC66	6#	?	+
VC66 $	6H	?	+
VC66 G	6"	?	+
VC66 #	6	?	+
VC66 H	6!	?	+
VC66 "	6	?	+
VC66	6	?	+

#!= =. ''	%		
VC66 !	6 A	?	+
VC66	6 $ A$	?	+
VC66 7	6 G AG	?	+
VC66 B	6 # A#	?	+
VC66	6 H AH	?	+
VC66 9	6 " A"	?	+
VC66 5	6 A	?	+
VC66 6	6 ! A!	?	+
VC669	6 A	?	+
VC669	6$ A	?	+
VC669$	6$	?	+
VC669G	6$$ $	?	+
VC669#	6$G G	?	+
VC669H	6$# #	?	+
VC669"	6$H H	?	+
VC669	6$" "	?	+
VC669!	6$	?	+
VC669	6$! !	?	+
VC6697	6$	?	+
VC669B	6G	?	+
VC669	6G	?	+
VC6699	6G$ $	?	+
VC6695	6GG G	?	+
VC6696	6G# #	?	+
VC665	6GH H	?	+
VC665	A56% 486%	?	+
VC665$	8'4% 486%	?	+
VC665G	A56% &=% &A	?	+
VC665#	8'4% &=% &A	?	+
VC665H	7) A& ?	?	+
VC665"	486% A& ?	?	+
VC665	A56% @5%7	?	+
VC665!	8'4% @5%7	?	+
VC665	A56% 7A%	?	+
VC6657	8'4% 7A%	?	+
VC665B	A56% <)5	?	+
VC665	8'4% <)5	?	+
VC6659	A56% 4>)5	?	+

#!= =. "	%	
VC6655	8'4% 4>)5	? +
VC6666	95A5%5 <B&<%	? +

% ? + - ?B/ 5C , 3 + *
+ + E + + .% ? + 5C 2) . 7
+ C

% G$ + ++ E 8B@ G$ *

#!= =. "	%	
VC69	G$ 9<)A8 7%5	G$
VC69 $	G$ 685A9@7 ?	G$
VC69 G	G$ 8'4%$	G$
VC69 #	G$ A56%$	G$
VC69 H	G$ B7 ?%7B	G$
VC69 "	G$ 5 7 55&6	G$
VC69	G$ 5 7 58=)<%	G$
VC69 !	G$ 5 5%	G$
VC69	G$ I<8%	G$
VC69 7	G$)7	G$
VC69 B	G$)7$	G$
VC69	G$)7G	G$
VC69 9	G$ %5 %	G$
VC69 5	G$ 7%%=	G$
VC69 6	G$ < & BA8=?	G$
VC69	G$ 7A% < &	G$
VC69	G$?5> A8 ?	G$
VC69 $	G$ K<@)	G$
VC69 G	G$ 895=%	G$
VC69 #	G$ <A5	G$
VC69 H	G$ &)>	G$
VC69 "	G$)A7>	G$
VC69	G$ 5%<)	G$
VC69 !	G$ 5 & 9	G$
VC69	G$ 47='5 55=	G$
VC69 7	G$ 95A5%5 & 9	G$
VC69 B	G$ 5 5A5 %	G$
VC69	G$ < & 5A5 %	G$
VC69 9	G$) 8=% 55=	G$
VC69 5	G$ 5=%5	G$

Vendor KEYSYMs

% ?5> >@ (* VC VC 6666666 3 3
+ C 7* VC VC 6666
+ + E + ?5> >@

Legacy KEYSYMs

% + * * 8 & "#" 0 < + , 3 %
* (* + + ! + + + 3
D 3 (+ $ B G + + + + #
! 3 ((,

,$ 2	,$ 3	,$ 2	,$ 3
	A $		7)A
$	A G	$	4 ,
G	A #	G	%
#	?	#	?
H	7	H	A H
"		"	A "
	' E		A
!	%	!	A !
			A
	)(	G$	(

5 , + 3 * 3 + , +(
, + 3 (- ,
G 3 (/

% A 7 ' E 4 , + % , E *
+ 3 8 & !!H 3 * 4 , 3
+ ' E (+ (+ 3
8 & + + % % +)(+ 9
5F(* + + F(3 + + ,
3 *

% , + + D + A ?5> >@ , * (+
(+ (* C (* ((F(3 < +
, 8 & !!H 3 + (*
< + (* 3 + + C *
?5> >@ * 3 + < + ?5> >@ (+ (+ +
3

7 (< + ?5> >@ * A ?5> >@ *
+ (+ , + , ((3 + + @ ?5> >@
%)(7)A + (-, C
VC$ 7 / , 3 (+ + , (+
< + 8 ((, , + * < +
+ + + +(< + ?5> >@

#!= =. ''	(''	%		
VC 7	<R #	A7%8= 7)8%7A A5%%5 7 8%4 &'&=5?	A	$
VC 7$	<R $9!	B 5 5	A	$
VC 7G	<R #	A7%8= 7)8%7A A5%%5 A 8%4 % &?5	A	$
VC 7H	<R G9	A7%8= 7)8%7A A5%%5 A 8%4 7 &=	A	$
VC 7"	<R H7	A7%8= 7)8%7A A5%%5 8%4 7 <%5	A	$
VC 7	<R "	A7%8= 7)8%7A A5%%5 8%4 7 &=	A	$
VC 77	<R H5	A7%8= 7)8%7A A5%%5 8%4 598AA7	A	$
VC 7B	<R "#	A7%8= 7)8%7A A5%%5 % 8%4 7 &=	A	$
VC 7	<R	A7%8= 7)8%7A A5%%5 X 8%4 7 <%5	A	$
VC 75	<R 9	A7%8= 7)8%7A A5%%5 X 8%4 7 &=	A	$
VC 76	<R B	A7%8= 7)8%7A A5%%5 X 8%4 9&% 7B& 5	A	$
VC B	<R H	A7%8= @7AA A5%%5 7 8%4 &'&=5?	A	$
VC B$	<R $9B	&'&=5?	A	$
VC BG	<R #$	A7%8= @7AA A5%%5 A 8%4 % &?5	A	$
VC BH	<R G5	A7%8= @7AA A5%%5 A 8%4 7 &=	A	$
VC B"	<R HB	A7%8= @7AA A5%%5 8%4 7 <%5	A	$
VC B	<R $	7 &=	A	$
VC B	<R "	A7%8= @7AA A5%%5 8%4 7 &=	A	$
VC B7	<R H6	A7%8= @7AA A5%%5 8%4 598AA7	A	$
VC BB	<R "H	A7%8= @7AA A5%%5 % 8%4 7 &=	A	$
VC B	<R 7	A7%8= @7AA A5%%5 X 8%4 7 <%5	A	$
VC B9	<R $99	9&<BA5 7 <%5 7 5=%	A	$
VC B5	<R 5	A7%8= @7AA A5%%5 X 8%4 7 &=	A	$
VC B6	<R	A7%8= @7AA A5%%5 X 8%4 9&% 7B& 5	A	$
VC	<R H#	A7%8= 7)8%7A A5%%5 8%4 7 <%5	A	$
VC G	<R $	A7%8= 7)8%7A A5%%5 7 8%4 B 5 5	A	$
VC H	<R G	A7%8= 7)8%7A A5%%5 A 8%4 7 <%5	A	$
VC "	<R "	A7%8= 7)8%7A A5%%5 8%4 7 <%5	A	$
VC !	<R	A7%8= 7)8%7A A5%%5 8%4 7 &=	A	$
VC 7	<R !	A7%8= 7)8%7A A5%%5 5 8%4 &'&=5?	A	$
VC	<R 7	A7%8= 7)8%7A A5%%5 5 8%4 7 &=	A	$
VC 6	<R 5	A7%8= 7)8%7A A5%%5 9 8%4 7 &=	A	$
VC 9	<R	A7%8= 7)8%7A A5%%5 9 8%4 % &?5	A	$
VC 9	<R #G	A7%8= 7)8%7A A5%%5 = 8%4 7 <%5	A	$
VC 9$	<R #	A7%8= 7)8%7A A5%%5 = 8%4 7 &=	A	$
VC 9H	<R H	A7%8= 7)8%7A A5%%5 & 8%4 9&<BA5 7 <%5	A	$
VC 9!	<R H!	A7%8= 7)8%7A A5%%5 8%4 7 &=	A	$

#!= =. ''	(''	%		
VC 9	<R "5	A7%8= 7)8%7A A5%%5 < 8%4 8=' 7B& 5	A	$
VC 9B	<R	A7%8= 7)8%7A A5%%5 < 8%4 9&<BA5 7 <%5	A	$
VC 95	<R "$	A7%8= 7)8%7A A5%%5 % 8%4 598AA7	A	$
VC 5	<R HH	A7%8= @7AA A5%%5 8%4 7 <%5	A	$
VC 5G	<R G	A7%8= @7AA A5%%5 7 8%4 B 5 5	A	$
VC 5H	<R G7	A7%8= @7AA A5%%5 A 8%4 7 <%5	A	$
VC 5"	<R	A7%8= @7AA A5%%5 8%4 7 <%5	A	$
VC 5!	<R 9	A7%8= @7AA A5%%5 8%4 7 &=	A	$
VC 57	<R	A7%8= @7AA A5%%5 5 8%4 &'&=5?	A	$
VC 5	<R B	A7%8= @7AA A5%%5 5 8%4 7 &=	A	$
VC 56	<R 6	A7%8= @7AA A5%%5 9 8%4 7 &=	A	$
VC 6	<R	A7%8= @7AA A5%%5 9 8%4 % &?5	A	$
VC 6	<R ##	A7%8= @7AA A5%%5 = 8%4 7 <%5	A	$
VC 6$	<R #!	A7%8= @7AA A5%%5 = 8%4 7 &=	A	$
VC 6H	<R H	A7%8= @7AA A5%%5 & 8%4 9&<BA5 7 <%5	A	$
VC 6!	<R H	A7%8= @7AA A5%%5 8%4 7 &=	A	$
VC 6	<R "6	A7%8= @7AA A5%%5 < 8%4 8=' 7B& 5	A	$
VC 6B	<R	A7%8= @7AA A5%%5 < 8%4 9&<BA5 7 <%5	A	$
VC 65	<R "G	A7%8= @7AA A5%%5 % 8%4 598AA7	A	$
VC 66	<R $9	9&% 7B& 5	A	$
VC $7	<R $"	A7%8= 7)8%7A A5%%5 4 8%4 % &?5	A	G
VC $7"	<R $#	A7%8= 7)8%7A A5%%5 4 8%4 8 <@6A5	A	G
VC $7	<R G	A7%8= 7)8%7A A5%%5 8 8%4 9&% 7B& 5	A	G
VC $7B	<R 5	A7%8= 7)8%7A A5%%5 ' 8%4 B 5 5	A	G
VC $7	<R G#	A7%8= 7)8%7A A5%%5 K 8%4 8 <@6A5	A	G
VC $B	<R $	A7%8= @7AA A5%%5 4 8%4 % &?5	A	G
VC $B"	<R $H	A7%8= @7AA A5%%5 4 8%4 8 <@6A5	A	G
VC $B	<R G	A7%8= @7AA A5%%5 9&%A5 8	A	G
VC $BB	<R 6	A7%8= @7AA A5%%5 ' 8%4 B 5 5	A	G
VC $B	<R GH	A7%8= @7AA A5%%5 K 8%4 8 <@6A5	A	G
VC $ H	<R 7	A7%8= 7)8%7A A5%%5 8%4 9&% 7B& 5	A	G
VC $ "	<R !	A7%8= 7)8%7A A5%%5 8%4 8 <@6A5	A	G
VC $9H	<R $	A7%8= 7)8%7A A5%%5 ' 8%4 9&% 7B& 5	A	G
VC $9!	<R	A7%8= 7)8%7A A5%%5 ' 8%4 8 <@6A5	A	G
VC $99	<R "	A7%8= 7)8%7A A5%%5 < 8%4 B 5 5	A	G
VC $95	<R H	A7%8= 7)8%7A A5%%5 8%4 8 <@6A5	A	G
VC $5H	<R B	A7%8= @7AA A5%%5 8%4 9&% 7B& 5	A	G

#!= =. ''	(''	%		
VC $5"	<R	A7%8= @7AA A5%%5 8%4 8 <@6A5	A	G
VC $6H	<R $	A7%8= @7AA A5%%5 ' 8%4 9&% 7B& 5	A	G
VC $6!	<R 9	A7%8= @7AA A5%%5 ' 8%4 8 <@6A5	A	G
VC $69	<R "9	A7%8= @7AA A5%%5 < 8%4 B 5 5	A	G
VC $65	<R H9	A7%8= @7AA A5%%5 8%4 8 <@6A5	A	G
VC G7$	<R G!	A7%8= @7AA A5%%5 ? 7	A	#
VC G7G	<R H"	A7%8= 7)8%7A A5%%5 8%4 598AA7	A	#
VC G7H	<R $!	A7%8= 7)8%7A A5%%5 8 8%4 %8A95	A	#
VC G7"	<R GB	A7%8= 7)8%7A A5%%5 A 8%4 598AA7	A	#
VC G77	<R $	A7%8= 7)8%7A A5%%5 5 8%4 @7 &=	A	#
VC G7B	<R $$	A7%8= 7)8%7A A5%%5 ' 8%4 598AA7	A	#
VC G7	<R ""	A7%8= 7)8%7A A5%%5 % 8%4 % &?5	A	#
VC GBG	<R H	A7%8= @7AA A5%%5 8%4 598AA7	A	#
VC GBH	<R $	A7%8= @7AA A5%%5 8 8%4 %8A95	A	#
VC GB"	<R G	A7%8= @7AA A5%%5 A 8%4 598AA7	A	#
VC GB7	<R G	A7%8= @7AA A5%%5 5 8%4 @7 &=	A	#
VC GBB	<R $G	A7%8= @7AA A5%%5 ' 8%4 598AA7	A	#
VC GB	<R "	A7%8= @7AA A5%%5 % 8%4 % &?5	A	#
VC GB9	<R #7	A7%8= 7)8%7A A5%%5 5='	A	#
VC GB6	<R #B	A7%8= @7AA A5%%5 5='	A	#
VC G	<R	A7%8= 7)8%7A A5%%5 7 8%4 @7 &=	A	#
VC G	<R $5	A7%8= 7)8%7A A5%%5 8 8%4 &'&=5?	A	#
VC G	<R "	A7%8= 7)8%7A A5%%5 5 8%4 9&% 7B& 5	A	#
VC G 6	<R $7	A7%8= 7)8%7A A5%%5 8 8%4 @7 &=	A	#
VC G9	<R #H	A7%8= 7)8%7A A5%%5 = 8%4 598AA7	A	#
VC G9$	<R #	A7%8= 7)8%7A A5%%5 & 8%4 @7 &=	A	#
VC G9G	<R G"	A7%8= 7)8%7A A5%%5 ? 8%4 598AA7	A	#
VC G9	<R $	A7%8= 7)8%7A A5%%5 < 8%4 &'&=5?	A	#
VC G99	<R "!	A7%8= 7)8%7A A5%%5 < 8%4 %8A95	A	#
VC G95	<R "7	A7%8= 7)8%7A A5%%5 < 8%4 @7 &=	A	#
VC G5	<R	A7%8= @7AA A5%%5 7 8%4 @7 &=	A	#
VC G5	<R $6	A7%8= @7AA A5%%5 8 8%4 &'&=5?	A	#
VC G5	<R	A7%8= @7AA A5%%5 5 8%4 9&% 7B& 5	A	#
VC G56	<R $B	A7%8= @7AA A5%%5 8 8%4 @7 &=	A	#
VC G6	<R #"	A7%8= @7AA A5%%5 = 8%4 598AA7	A	#
VC G6$	<R #9	A7%8= @7AA A5%%5 & 8%4 @7 &=	A	#
VC G6G	<R G	A7%8= @7AA A5%%5 ? 8%4 598AA7	A	#
VC G6	<R G	A7%8= @7AA A5%%5 < 8%4 &'&=5?	A	#

#!= =. ''	(''	%		
VC G69	<R "	A7%8= @7AA A5%%5 < 8%4 %8A95	A	#
VC G65	<R "B	A7%8= @7AA A5%%5 < 8%4 @7 &=	A	#
VC # 5	<R$ G5	& 5 A8=5	?	
VC #7	<RG $	?7=7 6<AA %&)	?	
VC #7$	<RG	?7=7 &)5=8=' B 7 ?5%	?	
VC #7G	<RG 9	?7=7 A& 8=' B 7 ?5%	?	
VC #7#	<RG	?7=7 &@@7	?	
VC #7H	<RG 6B	?7=7 &=K<= %8 5	?	
VC #7"	<RG 6$	?7=7 A5%%5 &	?	
VC #7	<RG 7	?7=7 A5%%5 @7AA 7	?	
VC #7!	<RG 7G	?7=7 A5%%5 @7AA 8	?	
VC #7	<RG 7H	?7=7 A5%%5 @7AA <	?	
VC #77	<RG 7	?7=7 A5%%5 @7AA 5	?	
VC #7B	<RG 7	?7=7 A5%%5 @7AA &	?	
VC #7	<RG 5G	?7=7 A5%%5 @7AA >7	?	
VC #79	<RG 5H	?7=7 A5%%5 @7AA ><	?	
VC #75	<RG 5	?7=7 A5%%5 @7AA >&	?	
VC #76	<RG G	?7=7 A5%%5 @7AA % <	?	
VC #B	<RG 6	) &A&='59 &<=9 >@B&A	?	
VC #B	<RG 7$	?7=7 A5%%5 7	?	
VC #B$	<RG 7#	?7=7 A5%%5 8	?	
VC #BG	<RG 7"	?7=7 A5%%5 <	?	
VC #B#	<RG 7!	?7=7 A5%%5 5	?	
VC #BH	<RG 77	?7=7 A5%%5 &	?	
VC #B"	<RG 7B	?7=7 A5%%5 ?7	?	
VC #B	<RG 79	?7=7 A5%%5 ?8	?	
VC #B!	<RG 76	?7=7 A5%%5 ?<	?	
VC #B	<RG B	?7=7 A5%%5 ?5	?	
VC #B7	<RG BG	?7=7 A5%%5 ?&	?	
VC #BB	<RG BH	?7=7 A5%%5 7	?	
VC #B	<RG B	?7=7 A5%%5 48	?	
VC #B9	<RG B	?7=7 A5%%5 <	?	
VC #B5	<RG BB	?7=7 A5%%5 5	?	
VC #B6	<RG B9	?7=7 A5%%5 &	?	
VC #	<RG B6	?7=7 A5%%5 %7	?	
VC #	<RG	?7=7 A5%%5 48	?	
VC # $	<RG #	?7=7 A5%%5 % <	?	
VC # G	<RG "	?7=7 A5%%5 %5	?	

#!= =. ''	(''	%	
VC # #	<RG !	?7=7 A5%%5 %&	?
VC # H	<RG 7	?7=7 A5%%5 =7	?
VC # "	<RG B	?7=7 A5%%5 =8	?
VC #	<RG	?7=7 A5%%5 =<	?
VC # !	<RG 9	?7=7 A5%%5 =5	?
VC #	<RG 5	?7=7 A5%%5 =&	?
VC # 7	<RG 6	?7=7 A5%%5 47	?
VC # B	<RG 9$	?7=7 A5%%5 48	?
VC #	<RG 9H	?7=7 A5%%5 6<	?
VC # 9	<RG 9!	?7=7 A5%%5 45	?
VC # 5	<RG 9B	?7=7 A5%%5 4&	?
VC # 6	<RG 95	?7=7 A5%%5 @7	?
VC #9	<RG 96	?7=7 A5%%5 @8	?
VC #9	<RG 5	?7=7 A5%%5 @<	?
VC #9$	<RG 5	?7=7 A5%%5 @5	?
VC #9G	<RG 5$	?7=7 A5%%5 @&	?
VC #9#	<RG 5#	?7=7 A5%%5 >7	?
VC #9H	<RG 5"	?7=7 A5%%5 ><	?
VC #9"	<RG 5!	?7=7 A5%%5 >&	?
VC #9	<RG 5	?7=7 A5%%5 7	?
VC #9!	<RG 57	?7=7 A5%%5 8	?
VC #9	<RG 5B	?7=7 A5%%5 <	?
VC #97	<RG 5	?7=7 A5%%5 5	?
VC #9B	<RG 59	?7=7 A5%%5 &	?
VC #9	<RG 56	?7=7 A5%%5 7	?
VC #99	<RG 6G	?7=7 A5%%5 =	?
VC #95	<RG B	&8 59 &<=9 >@B&A	?
VC #96	<RG	5@8 &8 59 &<=9 >@B&A	?
VC H7	<R "	7 7B8 &@@7	7
VC HBB	<R " B	7 7B8 5@8 &A&=	7
VC HB6	<R " 6	7 7B8 I<5 %8&= @7 ?	7
VC H	<R "$	7 7B8 A5%%5 47@X7	7
VC H $	<R "$$	7 7B8 A5%%5 7A56 8%4 @7997 7B& 5	7
VC H G	<R "$G	7 7B8 A5%%5 7A56 8%4 47@X7 7B& 5	7
VC H #	<R "$#	7 7B8 A5%%5 7 8%4 47@X7 7B& 5	7
VC H H	<R "$H	7 7B8 A5%%5 7A56 8%4 47@X7 B5A&	7
VC H "	<R "$"	7 7B8 A5%%5 >54 8%4 47@X7 7B& 5	7
VC H	<R "$	7 7B8 A5%%5 7A56	7

#!= =. ''	(''	%	
VC H !	<R "$!	7 7B8 A5%%5 B54	7
VC H	<R "$	7 7B8 A5%%5 %54 @7 B<%7	7
VC H 7	<R "$7	7 7B8 A5%%5 %54	7
VC H B	<R "$B	7 7B8 A5%%5 %454	7
VC H	<R "$	7 7B8 A5%%5 K55@	7
VC H 9	<R "$9	7 7B8 A5%%5 474	7
VC H 5	<R "$5	7 7B8 A5%%5 ?474	7
VC H 6	<R "$6	7 7B8 A5%%5 97A	7
VC H9	<R "G	7 7B8 A5%%5 %47A	7
VC H9	<R "G	7 7B8 A5%%5 54	7
VC H9$	<R "G$	7 7B8 A5%%5 X78=	7
VC H9G	<R "GG	7 7B8 A5%%5 55=	7
VC H9#	<R "G#	7 7B8 A5%%5 455=	7
VC H9H	<R "GH	7 7B8 A5%%5 79	7
VC H9"	<R "G"	7 7B8 A5%%5 979	7
VC H9	<R "G	7 7B8 A5%%5 %74	7
VC H9!	<R "G!	7 7B8 A5%%5 X74	7
VC H9	<R "G	7 7B8 A5%%5 78=	7
VC H97	<R "G7	7 7B8 A5%%5 '478=	7
VC H5	<R "#	7 7B8 %7% 55A	7
VC H5	<R "#	7 7B8 A5%%5 654	7
VC H5$	<R "#$	7 7B8 A5%%5 I76	7
VC H5G	<R "#G	7 7B8 A5%%5 ?76	7
VC H5#	<R "##	7 7B8 A5%%5 A7@	7
VC H5H	<R "#H	7 7B8 A5%%5 @55@	7
VC H5"	<R "#"	7 7B8 A5%%5 =&&=	7
VC H5	<R "#	7 7B8 A5%%5 454	7
VC H5!	<R "#!	7 7B8 A5%%5 7	7
VC H5	<R "#	7 7B8 A5%%5 7A56 @7? < 7	7
VC H57	<R "#7	7 7B8 A5%%5 >54	7
VC H5B	<R "#B	7 7B8 67%47%7=	7
VC H5	<R "#	7 7B8 97@@7%7=	7
VC H59	<R "#9	7 7B8 ?7 7%7=	7
VC H55	<R "#5	7 7B8 67%47	7
VC H56	<R "#6	7 7B8 97@@7	7
VC H6	<R "H	7 7B8 ?7 7	7
VC H6	<R "H	7 7B8 47997	7
VC H6$	<R "H$	7 7B8 <?<=	7

#!= =. ''	(''	%
VC "7	<R #H$	> 8AA8 @7AA A5%%5 9K5
VC "7$	<R #HG	> 8AA8 @7AA A5%%5 'K5
VC "7G	<R #H	> 8AA8 @7AA A5%%5 8&
VC "7#	<R #H#	> 8AA8 @7AA A5%%5 <? 78=87= 85
VC "7H	<R #HH	> 8AA8 @7AA A5%%5 9X5
VC "7"	<R #H"	> 8AA8 @7AA A5%%5 B>5A& < 87= <? 78=87= 8
VC "7	<R #H	> 8AA8 @7AA A5%%5 >8
VC "7!	<R #H!	> 8AA8 @7AA A5%%5 K5
VC "7	<R #H	> 8AA8 @7AA A5%%5 AK5
VC "77	<R #H7	> 8AA8 @7AA A5%%5 =K5
VC "7B	<R #HB	> 8AA8 @7AA A5%%5 % 45
VC "7	<R #H	> 8AA8 @7AA A5%%5 ?K5
VC "79	<R #	> 8AA8 @7AA A5%%5 '45 8%4 <)%< =
VC "75	<R #H5	> 8AA8 @7AA A5%%5 4& % <
VC "76	<R #H6	> 8AA8 @7AA A5%%5 9X45
VC "B	<R$ "	=<@5 & 8'=
VC "B	<R # $	> 8AA8 7)8%7A A5%%5 9K5
VC "B$	<R # G	> 8AA8 7)8%7A A5%%5 'K5
VC "BG	<R #	> 8AA8 7)8%7A A5%%5 8&
VC "B#	<R # #	> 8AA8 7)8%7A A5%%5 <? 78=87= 85
VC "BH	<R # H	> 8AA8 7)8%7A A5%%5 9X5
VC "B"	<R # "	> 8AA8 7)8%7A A5%%5 B>5A& < 87= <? 78=87= 8
VC "B	<R #	> 8AA8 7)8%7A A5%%5 >8
VC "B!	<R # !	> 8AA8 7)8%7A A5%%5 K5
VC "B	<R #	> 8AA8 7)8%7A A5%%5 AK5
VC "B7	<R # 7	> 8AA8 7)8%7A A5%%5 =K5
VC "BB	<R # B	> 8AA8 7)8%7A A5%%5 % 45
VC "B	<R #	> 8AA8 7)8%7A A5%%5 ?K5
VC "B9	<R #	> 8AA8 7)8%7A A5%%5 '45 8%4 <)%< =
VC "B5	<R # 5	> 8AA8 7)8%7A A5%%5 4& % <
VC "B6	<R # 6	> 8AA8 7)8%7A A5%%5 9X45
VC "	<R ##5	> 8AA8 @7AA A5%%5 ><
VC "	<R #G	> 8AA8 @7AA A5%%5 7
VC " $	<R #G	> 8AA8 @7AA A5%%5 B5
VC " G	<R ##"	> 8AA8 @7AA A5%%5 % 5
VC " #	<R #G#	> 8AA8 @7AA A5%%5 95
VC " H	<R #GH	> 8AA8 @7AA A5%%5 85

#!= =. ''	(''	%
VC " "	<R ###	> 8AA8 @7AA A5%%5 56
VC "	<R #GG	> 8AA8 @7AA A5%%5 '45
VC " !	<R ##H	> 8AA8 @7AA A5%%5 47
VC "	<R #G!	> 8AA8 @7AA A5%%5 8
VC " 7	<R #G	> 8AA8 @7AA A5%%5 4& % 8
VC " B	<R #G7	> 8AA8 @7AA A5%%5 ?7
VC "	<R #GB	> 8AA8 @7AA A5%%5 5A
VC " 9	<R #G	> 8AA8 @7AA A5%%5 5@
VC " 5	<R #G9	> 8AA8 @7AA A5%%5 5=
VC " 6	<R #G5	> 8AA8 @7AA A5%%5 &
VC "9	<R #G6	> 8AA8 @7AA A5%%5)5
VC "9	<R ##6	> 8AA8 @7AA A5%%5 >7
VC "9$	<R ##	> 8AA8 @7AA A5%%5 5
VC "9G	<R ##	> 8AA8 @7AA A5%%5 5
VC "9#	<R ##$	> 8AA8 @7AA A5%%5 %5
VC "9H	<R ##G	> 8AA8 @7AA A5%%5 <
VC "9"	<R #G"	> 8AA8 @7AA A5%%5 X45
VC "9	<R #G$	> 8AA8 @7AA A5%%5 5
VC "9!	<R ##	> 8AA8 @7AA A5%%5 &6% 8'=
VC "9	<R ##B	> 8AA8 @7AA A5%%5 >5 <
VC "97	<R #G	> 8AA8 @7AA A5%%5 X5
VC "9B	<R ##!	> 8AA8 @7AA A5%%5 47
VC "9	<R ##9	> 8AA8 @7AA A5%%5 5
VC "99	<R ##	> 8AA8 @7AA A5%%5 4 47
VC "95	<R ##	> 8AA8 @7AA A5%%5 45
VC "96	<R ##7	> 8AA8 @7AA A5%%5 47 9 8'=
VC "5	<R #$5	> 8AA8 7)8%7A A5%%5 ><
VC "5	<R #	> 8AA8 7)8%7A A5%%5 7
VC "5$	<R #	> 8AA8 7)8%7A A5%%5 B5
VC "5G	<R #$"	> 8AA8 7)8%7A A5%%5 % 5
VC "5#	<R # #	> 8AA8 7)8%7A A5%%5 95
VC "5H	<R # H	> 8AA8 7)8%7A A5%%5 85
VC "5"	<R #$#	> 8AA8 7)8%7A A5%%5 56
VC "5	<R # G	> 8AA8 7)8%7A A5%%5 '45
VC "5!	<R #$H	> 8AA8 7)8%7A A5%%5 47
VC "5	<R # !	> 8AA8 7)8%7A A5%%5 8
VC "57	<R #	> 8AA8 7)8%7A A5%%5 4& % 8
VC "5B	<R # 7	> 8AA8 7)8%7A A5%%5 ?7

#!= =. ''	(''	%		
VC "5	<R # B	> 8AA8 7)8%7A A5%%5 5A		
VC "59	<R #	> 8AA8 7)8%7A A5%%5 5@		
VC "55	<R # 9	> 8AA8 7)8%7A A5%%5 5=		
VC "56	<R # 5	> 8AA8 7)8%7A A5%%5 &		
VC "6	<R # 6	> 8AA8 7)8%7A A5%%5)5		
VC "6	<R #$6	> 8AA8 7)8%7A A5%%5 >7		
VC "6$	<R #$	> 8AA8 7)8%7A A5%%5 5		
VC "6G	<R #$	> 8AA8 7)8%7A A5%%5 5		
VC "6#	<R #$$	> 8AA8 7)8%7A A5%%5 %5		
VC "6H	<R #$G	> 8AA8 7)8%7A A5%%5 <		
VC "6"	<R # "	> 8AA8 7)8%7A A5%%5 X45		
VC "6	<R # $	> 8AA8 7)8%7A A5%%5 5		
VC "6!	<R #$	> 8AA8 7)8%7A A5%%5 &6% 8'=		
VC "6	<R #$B	> 8AA8 7)8%7A A5%%5 >5 <		
VC "67	<R #	> 8AA8 7)8%7A A5%%5 X5		
VC "6B	<R #$!	> 8AA8 7)8%7A A5%%5 47		
VC "6	<R #$9	> 8AA8 7)8%7A A5%%5 5		
VC "69	<R #$	> 8AA8 7)8%7A A5%%5 4 47		
VC "65	<R #$	> 8AA8 7)8%7A A5%%5 45		
VC "66	<R #$7	> 8AA8 7)8%7A A5%%5 47 9 8'=		
VC 7	<R G!"	' 55? 7)8%7A A5%%5 7A)47 8%4 %&=&	'	E
VC 7$	<R G!!	' 55? 7)8%7A A5%%5 5) 8A&= 8%4 %&=&	'	E
VC 7G	<R G!	' 55? 7)8%7A A5%%5 5%7 8%4 %&=&	'	E
VC 7#	<R G!7	' 55? 7)8%7A A5%%5 8&%7 8%4 %&=&	'	E
VC 7H	<R G77	' 55? 7)8%7A A5%%5 8&%7 8%4 987A>%8?7	'	E
VC 7	<R G!	' 55? 7)8%7A A5%%5 &@8 &= 8%4 %&=&	'	E
VC 7!	<R G!5	' 55? 7)8%7A A5%%5 <) 8A&= 8%4 %&=&	'	E
VC 7	<R G7B	' 55? 7)8%7A A5%%5 <) 8A&= 8%4 987 A>%8?7	'	E
VC 7B	<R G!6	' 55? 7)8%7A A5%%5 &@5'7 8%4 %&=&	'	E
VC 75	<R G!H	' 55? 987A>%8?7 %&=&	'	E
VC 76	<R$ H	4& 8X&=%7A B7	'	E
VC B	<R G7	' 55? @7AA A5%%5 7A)47 8%4 %&=&	'	E
VC B$	<R G79	' 55? @7AA A5%%5 5) 8A&= 8%4 %&=&	'	E
VC BG	<R G75	' 55? @7AA A5%%5 5%7 8%4 %&=&	'	E
VC B#	<R G76	' 55? @7AA A5%%5 8&%7 8%4 %&=&	'	E
VC BH	<R G 7	' 55? @7AA A5%%5 8&%7 8%4 987A>%8?7	'	E

#!= =. ''	(''	%	
VC B"	<R G	' 55? @7AA A5%%5 8&%7 8%4 987A>%8?7 7=9 %&=&	' E
VC B	<R G	' 55? @7AA A5%%5 &@8 &= 8%4 %&=&	' E
VC B!	<R G 9	' 55? @7AA A5%%5 <) 8A&= 8%4 %&=&	' E
VC B	<R G B	' 55? @7AA A5%%5 <) 8A&= 8%4 987A>%8 ?7	' E
VC B7	<R GB	' 55? @7AA A5%%5 <) 8A&= 8%4 987A>%8 ?7 7=9 %&=&	' E
VC BB	<R G 5	' 55? @7AA A5%%5 &@5'7 8%4 %&=&	' E
VC	<R G	' 55? 7)8%7A A5%%5 7A)47	' E
VC $	<R G $	' 55? 7)8%7A A5%%5 B5%7	' E
VC G	<R G G	' 55? 7)8%7A A5%%5 '7@@7	' E
VC #	<R G #	' 55? 7)8%7A A5%%5 95A%7	' E
VC H	<R G H	' 55? 7)8%7A A5%%5 5) 8A&=	' E
VC "	<R G "	' 55? 7)8%7A A5%%5 X5%7	' E
VC	<R G	' 55? 7)8%7A A5%%5 5%7	' E
VC !	<R G !	' 55? 7)8%7A A5%%5 %45%7	' E
VC	<R G	' 55? 7)8%7A A5%%5 8&%7	' E
VC 7	<R G 7	' 55? 7)8%7A A5%%5 ?7))7	' E
VC B	<R G B	' 55? 7)8%7A A5%%5 A7@97	' E
VC	<R G	' 55? 7)8%7A A5%%5 @<	' E
VC 9	<R G 9	' 55? 7)8%7A A5%%5 =<	' E
VC 5	<R G 5	' 55? 7)8%7A A5%%5 8	' E
VC 6	<R G 6	' 55? 7)8%7A A5%%5 &@8 &=	' E
VC 9	<R G7	' 55? 7)8%7A A5%%5)8	' E
VC 9	<R G7	' 55? 7)8%7A A5%%5 4&	' E
VC 9$	<R G7G	' 55? 7)8%7A A5%%5 8'@7	' E
VC 9#	<R G7#	' 55? 7)8%7A A5%%5 %7<	' E
VC 9H	<R G7H	' 55? 7)8%7A A5%%5 <) 8A&=	' E
VC 9"	<R G7"	' 55? 7)8%7A A5%%5)48	' E
VC 9	<R G7	' 55? 7)8%7A A5%%5 48	' E
VC 9!	<R G7!	' 55? 7)8%7A A5%%5) 8	' E
VC 9	<R G7	' 55? 7)8%7A A5%%5 &@5'7	' E
VC 5	<R GB	' 55? @7AA A5%%5 7A)47	' E
VC 5$	<R GB$	' 55? @7AA A5%%5 B5%7	' E
VC 5G	<R GBG	' 55? @7AA A5%%5 '7@@7	' E
VC 5#	<R GB#	' 55? @7AA A5%%5 95A%7	' E
VC 5H	<R GBH	' 55? @7AA A5%%5 5) 8A&=	' E
VC 5"	<R GB"	' 55? @7AA A5%%5 X5%7	' E

#!= =. ''	(''	%	
VC 5	<R GB	' 55? @7AA A5%%5 5%7	' E
VC 5!	<R GB!	' 55? @7AA A5%%5 %45%7	' E
VC 5	<R GB	' 55? @7AA A5%%5 8&%7	' E
VC 57	<R GB7	' 55? @7AA A5%%5 ?7))7	' E
VC 5B	<R GBB	' 55? @7AA A5%%5 A7@97	' E
VC 5	<R GB	' 55? @7AA A5%%5 @<	' E
VC 59	<R GB9	' 55? @7AA A5%%5 =<	' E
VC 55	<R GB5	' 55? @7AA A5%%5 8	' E
VC 56	<R GB6	' 55? @7AA A5%%5 &@8 &=	' E
VC 6	<R G	' 55? @7AA A5%%5)8	' E
VC 6	<R G	' 55? @7AA A5%%5 4&	' E
VC 6$	<R G G	' 55? @7AA A5%%5 8'@7	' E
VC 6G	<R G $	' 55? @7AA A5%%5 68=7A 8'@7	' E
VC 6#	<R G #	' 55? @7AA A5%%5 %7<	' E
VC 6H	<R G H	' 55? @7AA A5%%5 <) 8A&=	' E
VC 6"	<R G "	' 55? @7AA A5%%5)48	' E
VC 6	<R G	' 55? @7AA A5%%5 48	' E
VC 6!	<R G !	' 55? @7AA A5%%5) 8	' E
VC 6	<R G	' 55? @7AA A5%%5 &@5'7	' E
VC !7	<R$GB	A56% 798 7A	%
VC !7$		%&) A56% 798 7A	%
VC !7G		4& 8X&=%7A &==5 %&	%
VC !7#	<RG	%&) 8=%5' 7A	%
VC !7H	<RG	B&%%&@ 8=%5' 7A	%
VC !7"		5 %8 7A &==5 %&	%
VC !7	<R$G7	%&) A56% I<7 5 B 7 ?5%	%
VC !7!	<R$G7G	B&%%&@ A56% I<7 5 B 7 ?5%	%
VC !7	<R$G7#	%&) 8'4% I<7 5 B 7 ?5%	%
VC !77	<R$G7"	B&%%&@ 8'4% I<7 5 B 7 ?5%	%
VC !7B	<R$G B	%&) A56%)7 5=%45 8	%
VC !7	<R$G 9	B&%%&@ A56%)7 5=%45 8	%
VC !79	<R$G 5	%&) 8'4%)7 5=%45 8	%
VC !75	<R$G7	B&%%&@ 8'4%)7 5=%45 8	%
VC !76	<R$G7!	A56% @899A5 < A> B 7 5	%
VC !B	<R$G7	8'4% @899A5 < A> B 7 5	%
VC !B		%&) A56% <@@7%8&=	%
VC !B$		B&%%&@ A56% <@@7%8&=	%
VC !BG		%&) 5 %8 7A <@@7%8&= &==5 %&	%

#!= =. ''	(''	%	
VC !B#		B&%%&@ 5 %8 7A <@@7%8&= &==5 %&	%
VC !BH		%&) 8'4% <@@7%8&=	%
VC !B"		B&%%&@ 8'4% <@@7%8&=	%
VC !B		8'4% @899A5 <@@7%8&=	%
VC !B	<R$$"#	A5 %47= & 5I<7A 8'=	%
VC !B9	<R$$"	=&% 5I<7A 8'=	%
VC !B5	<R$$"H	' 57%5 %47= & 5I<7A 8'=	%
VC !B6	<R$$$B	8=%5' 7A	%
VC !	<R$$G#	%45 56& 5	%
VC !	<R$$ 9	7 87%8&=) &)& %8&=7A %&	%
VC ! $	<R$$ 5	8=68=8%>	%
VC ! H	<R$$	=7BA7 95A	%
VC ! !	<R$$G	8 7)) & 8@7%5 %&	%
VC !	<R$$#G	8@8A7 & 5I<7A %&	%
VC ! 9	<R$ 9#	86 7=9 &=A> 86	%
VC ! 5	<R$ 9$	8@)A85	%
VC ! 6	<R$$"	895=%8 7A %&	%
VC !9"	<R$$ 7	798 7A	%
VC !97	<R$$!$	8 8= A<959 8=	%
VC !9B	<R$$!G	8= A<95	%
VC !9	<R$$$	8=%5 5 %8&=	%
VC !99	<R$$$7	<=8&=	%
VC !95	<R$$$	A&'8 7A 7=9	%
VC !96	<R$$$!	A&'8 7A &	%
VC !56	<R$$ $	)7 %87A 95 8 7%8 5	%
VC !6"	<R $	6<= %8&=	%
VC !6B	<R$	A56% 7 &	%
VC !6	<R$	<) 7 9 7 &	%
VC !69	<R$ $	8'4% 7 &	%
VC !65	<R$ G	9& = 7 9 7 &	%
VC 96		BA7=?	
VC 5	<R$H "	&A89 987@&=9	
VC 5	<R$H $	45 ?5 B&7 9	
VC 5$	<R$#	.4%.	
VC 5G	<R$#	.66.	
VC 5#	<R$# 9	. .	
VC 5H	<R$# 7	.A6.	
VC 5!	<R$#$#	.=A.	

#!= =. ''	(''	%	
VC 5	<R$# B	. %.	
VC 57	<R$H !	A& 5 8'4% & =5	
VC 5B	<R$H	<))5 8'4% & =5	
VC 5	<R$H	<))5 A56% & =5	
VC 59	<R$H #	A& 5 A56% & =5	
VC 55	<R$HG	& 8=' A8=5	
VC 56	<R$GB7	4& 8X&=%7A A8=5 7=	
VC 6	<R$GBB	4& 8X&=%7A A8=5 7= G	
VC 6	<R$H	4& 8X&=%7A A8=5 7= H	
VC 6$	<R$GB	4& 8X&=%7A A8=5 7=	
VC 6G	<R$GB9	4& 8X&=%7A A8=5 7=	
VC 6#	<R$H	A56% .%.	
VC 6H	<RH#	8'4% .%.	
VC 6"	<R$HG#	B&%%&@ .%.	
VC 6	<RH	%&) .%.	
VC 6!	<R$H $	5 %8 7A B7	
VC 77	<R$ G	5@)7 5	)(
VC 77$	<R$ $	5=)7 5	)(
VC 77G	<R$ #	G05@)7 5	)(
VC 77#	<R$ H	#05@)7 5	)(
VC 77H	<R$	98'8%)7 5	)(
VC 77"	<R$!	)<= %<7%8&=)7 5	)(
VC 77	<R$	%48=)7 5	)(
VC 77!	<R$ 7	478)7 5	)(
VC 77	<R$ #	5@ 97 4	)(
VC 777	<R$ G	5= 97 4	)(
VC 77		8'=868 7=% BA7=? >@B&A	)(
VC 775	<R$ $"	5AA8) 8	)(
VC 776	<R$ $H	9&<BA5 B7 5A8=5 9&%	)(
VC 7B	<R$ HG	<A'7 6 7 %8&= &=5 %48 9	)(
VC 7B	<R$ H#	<A'7 6 7 %8&= % & %48 9	)(
VC 7B$	<R$ HH	<A'7 6 7 %8&= &=5 686%4	)(
VC 7BG	<R$ H"	<A'7 6 7 %8&= % & 686%4	)(
VC 7B#	<R$ H	<A'7 6 7 %8&= %4 55 686%4	)(
VC 7BH	<R$ H!	<A'7 6 7 %8&= 6&< 686%4	)(
VC 7B"	<R$ H	<A'7 6 7 %8&= &=5 8 %4	)(
VC 7B	<R$ H7	<A'7 6 7 %8&= 68 5 8 %4	)(
VC 7B!	<R$ H	7 5 &6	)(

#!= =. ''	(''	%	
VC 7BB	<R$ $	68'< 5 97 4	)(
VC 7B		A56% 7='A5 B 7 ?5%	)(
VC 7B9		95 8@7A)&8=%	)(
VC 7B5		8'4% 7='A5 B 7 ?5%	)(
VC 7B6		@7 ?5	)(
VC 7 G	<R$ HB	<A'7 6 7 %8&= &=5 58'4%4	)(
VC 7 #	<R$ H	<A'7 6 7 %8&= %4 55 58'4%4	)(
VC 7 H	<R$ H9	<A'7 6 7 %8&= 68 5 58'4%4	)(
VC 7 "	<R$ H5	<A'7 6 7 %8&= 5 5= 58'4%4	)(
VC 7	<R$ $$	% 795@7 ? 8'=	)(
VC 7 7		8'=7%< 5 @7 ?	)(
VC 7 B		% 795@7 ? 8'= 8= 8 A5	)(
VC 7		A56% &)5= % 87='A5	)(
VC 7 9		8'4% &)5= % 87='A5	)(
VC 7 5		5@ &)5= 8 A5	)(
VC 7 6		5@ &)5= 5 %7='A5	)(
VC 79	<R$!	A56% 8='A5 I<&%7%8&= @7 ?	)(
VC 79	<R$	8'4% 8='A5 I<&%7%8&= @7 ?	)(
VC 79$	<R$	A56% 9&<BA5 I<&%7%8&= @7 ?	)(
VC 79G	<R$ 9	8'4% 9&<BA5 I<&%7%8&= @7 ?	)(
VC 79#	<R$ 5	) 5 8)%8&= %7?5 5 8)5	)(
VC 79H	<R$ G	)5 @8AA5 8'=	)(
VC 79"	<R$ G$	@8=<%5	)(
VC 79	<R$ GG	5 &=9	)(
VC 79	<R$ 9	A7%8= &	)(
VC 797		45 7' 7@	)(
VC 79B		68AA59 5 %7='A5 B<AA5%	)(
VC 79		68AA59 A56% % 87='A5 B<AA5%	)(
VC 799		68AA59 8'4% % 87='A5 B<AA5%	)(
VC 795		5@ 68AA59 8 A5	)(
VC 796		5@ 68AA59 5 %7='A5	)(
VC 75		5= &)5= 8 A5 B<AA5%	)(
VC 75		5= &)5= I<7 5 B<AA5%	)(
VC 75$		&)5= 5 %7='<A7 B<AA5%	)(
VC 75G		&)5= % 87='<A7 B<AA5% <)	)(
VC 75#		&)5= % 87='<A7 B<AA5% 9& =	)(
VC 75H		&)5= %7	)(
VC 75"		5= 68AA59 8 A5 B<AA5%	)(

#!= =. ''	(''	%	
VC 75		5= 68AA59 I<7 5 B<AA5%	)(
VC 75!		68AA59 % 87='<A7 B<AA5% <)	)(
VC 75		68AA59 % 87='<A7 B<AA5% 9& =	)(
VC 757		A56%)&8=%5	)(
VC 75B		8'4%)&8=%5	)(
VC 75	<R$""G	A<B	)(
VC 759	<R$"""	987@&=9	)(
VC 755	<R$""H	457 %	)(
VC 76	<R$ $	@7A%5 5 &	)(
VC 76	<R$ $	97"5	)(
VC 76$	<R$ $	9&<BA5 97"5	)(
VC 76G	<R$ G	45 ? @7 ? %8 ?	)(
VC 76#	<R$	B7AA&% &	)(
VC 76H	<R$""6	@< 8 7A 47)	)(
VC 76"	<R$""9	@< 8 7A 6A7%	)(
VC 76	<R$"#$	@7A5 >@B&A	)(
VC 76!	<R$"#	65@7A5 >@B&A	)(
VC 76	<R$" 5	%5A5)4&=5 >@B&A	)(
VC 767	<R$G H	%5A5)4&=5 5 & 95 >@B&A	)(
VC 76B	<R$	)4&=&' 7)4 &)> 8'4% 8'=	)(
VC 76	<R$ G!	7 5%	)(
VC 769	<R$ 7	8='A5 A& I<&%7%8&= @7 ?	)(
VC 765	<R$ 5	9&<BA5 A& I<&%7%8&= @7 ?	)(
VC 766		< &	)(
VC B7G		A56% 7 5%	7)A
VC B7"		8'4% 7 5%	7)A
VC B7!		9& = 7 5%	7)A
VC B7		<) 7 5%	7)A
VC B		& 5 B7	7)A
VC B $	<R$$7H	9& = %7 ?	7)A
VC B G		<) 4&5 - 7)/	7)A
VC B #	<R$G 7	9& = %8A5	7)A
VC B "		<=95 B7	7)A
VC B 7	<R$$!	K&%	7)A
VC B	<R$G H	I<79	7)A
VC B 5	<R$$7#	<) %7 ?	7)A
VC B 6	<R$H B	8 A5	7)A
VC B9G	<R$G !	<) %8A5	7)A

#!= =. ''	(''	%	
VC B9"		9& = 4&5 - <)/	7)A
VC B9!		8'4% 4&5	7)A
VC B97		A56% 4&5	7)A
VC B9	<R$$7$	A56% %7 ?	7)A
VC B6	<R$$7G	8'4% %7 ?	7)A
VC 96	<R$	9&<BA5 A& A8=5	4 ,
VC 5	<R H9	45B 5 A5%%5 7A56	4 ,
VC 5	<R H9	45B 5 A5%%5 B5%	4 ,
VC 5$	<R H9$	45B 5 A5%%5 '8@5A	4 ,
VC 5G	<R H9G	45B 5 A5%%5 97A5%	4 ,
VC 5#	<R H9#	45B 5 A5%%5 45	4 ,
VC 5H	<R H9H	45B 5 A5%%5 7	4 ,
VC 5"	<R H9"	45B 5 A5%%5 X7>8=	4 ,
VC 5	<R H9	45B 5 A5%%5 45%	4 ,
VC 5!	<R H9!	45B 5 A5%%5 %5%	4 ,
VC 5	<R H9	45B 5 A5%%5 >&9	4 ,
VC 57	<R H97	45B 5 A5%%5 68=7A ?76	4 ,
VC 5B	<R H9B	45B 5 A5%%5 ?76	4 ,
VC 5	<R H9	45B 5 A5%%5 A7@59	4 ,
VC 59	<R H99	45B 5 A5%%5 68=7A @5@	4 ,
VC 55	<R H95	45B 5 A5%%5 @5@	4 ,
VC 56	<R H96	45B 5 A5%%5 68=7A =<=	4 ,
VC 6	<R H5	45B 5 A5%%5 =<=	4 ,
VC 6	<R H5	45B 5 A5%%5 7@5?4	4 ,
VC 6$	<R H5$	45B 5 A5%%5 7>8=	4 ,
VC 6G	<R H5G	45B 5 A5%%5 68=7A)5	4 ,
VC 6#	<R H5#	45B 5 A5%%5)5	4 ,
VC 6H	<R H5H	45B 5 A5%%5 68=7A % 798	4 ,
VC 6"	<R H5"	45B 5 A5%%5 % 798	4 ,
VC 6	<R H5	45B 5 A5%%5 I&6	4 ,
VC 6!	<R H5!	45B 5 A5%%5 5 4	4 ,
VC 6	<R H5	45B 5 A5%%5 48=	4 ,
VC 67	<R H57	45B 5 A5%%5 %7	4 ,
VC 97	<R 5	%478 47 7 %5 ?& ?78	%
VC 97$	<R 5 $	%478 47 7 %5 ?4& ?478	%
VC 97G	<R 5 G	%478 47 7 %5 ?4& ?4<7%	%
VC 97#	<R 5 #	%478 47 7 %5 ?4& ?4 78	%
VC 97H	<R 5 H	%478 47 7 %5 ?4& ?4&=	%

#!= =. ''	(''	%	
VC 97"	<R 5 "	%478 47 7 %5 ?4& 7?47='	%
VC 97	<R 5	%478 47 7 %5 ='& ='<	%
VC 97!	<R 5 !	%478 47 7 %5 4& 47=	%
VC 97	<R 5	%478 47 7 %5 4& 48='	%
VC 977	<R 5 7	%478 47 7 %5 4& 47='	%
VC 97B	<R 5 B	%478 47 7 %5 & &	%
VC 97	<R 5	%478 47 7 %5 4& 4&5	%
VC 979	<R 5 9	%478 47 7 %5 >& >8='	%
VC 975	<R 5 5	%478 47 7 %5 9& 4797	%
VC 976	<R 5 6	%478 47 7 %5 %&)7%7?	%
VC 9B	<R 5	%478 47 7 %5 %4& %47=	%
VC 9B	<R 5	%478 47 7 %5 %4& =7='@&=%4&	%
VC 9B$	<R 5 $	%478 47 7 %5 %4&)4<%47&	%
VC 9BG	<R 5 G	%478 47 7 %5 =& =5=	%
VC 9B#	<R 5 #	%478 47 7 %5 9& 95?	%
VC 9BH	<R 5 H	%478 47 7 %5 %& %7&	%
VC 9B"	<R 5 "	%478 47 7 %5 %4& %4<='	%
VC 9B	<R 5	%478 47 7 %5 %4& %4747=	%
VC 9B!	<R 5 !	%478 47 7 %5 %4& %4&='	%
VC 9B	<R 5	%478 47 7 %5 =& =<	%
VC 9B7	<R 5 7	%478 47 7 %5 B& B78@78	%
VC 9BB	<R 5 B	%478 47 7 %5)&)A7	%
VC 9B	<R 5	%478 47 7 %5)4&)4<='	%
VC 9B9	<R 5 9	%478 47 7 %5 6& 67	%
VC 9B5	<R 5 5	%478 47 7 %5)4&)47=	%
VC 9B6	<R 5 6	%478 47 7 %5 6& 67=	%
VC 9	<R 5$	%478 47 7 %5)4& 7@)47&	%
VC 9	<R 5$	%478 47 7 %5 @& @7	%
VC 9 $	<R 5$$	%478 47 7 %5 >& >7?	%
VC 9 G	<R 5$G	%478 47 7 %5 & <7	%
VC 9 #	<R 5$#	%478 47 7 %5 <	%
VC 9 H	<R 5$H	%478 47 7 %5 A& A8='	%
VC 9 "	<R 5$"	%478 47 7 %5 A<	%
VC 9	<R 5$	%478 47 7 %5 & 75=	%
VC 9 !	<R 5$!	%478 47 7 %5 & 7A7	%
VC 9	<R 5$	%478 47 7 %5 & < 8	%
VC 9 7	<R 5$7	%478 47 7 %5 & <7	%
VC 9 B	<R 5$B	%478 47 7 %5 4& 48)	%

#!= =. ''	(''	%	
VC 9	<R 5$	%478 47 7 %5 A& 4<A7	%
VC 9 9	<R 5$9	%478 47 7 %5 & 7='	%
VC 9 5	<R 5$5	%478 47 7 %5 4& =&?4<?	%
VC 9 6	<R 5$6	%478 47 7 %5)78>7==&8	%
VC 99	<R 5G	%478 47 7 %5 7 7 7	%
VC 99	<R 5G	%478 47 7 %5 @78 47= 7?7%	%
VC 99$	<R 5G$	%478 47 7 %5 7 7 77	%
VC 99G	<R 5GG	%478 47 7 %5 7 7 7@	%
VC 99#	<R 5G#	%478 47 7 %5 7 7 8	%
VC 99H	<R 5GH	%478 47 7 %5 7 7 88	%
VC 99"	<R 5G"	%478 47 7 %5 7 7 <5	%
VC 99	<R 5G	%478 47 7 %5 7 7 <55	%
VC 99!	<R 5G!	%478 47 7 %5 7 7 <	%
VC 99	<R 5G	%478 47 7 %5 7 7 <<	%
VC 997	<R 5G7	%478 47 7 %5)48=%4<	%
VC 996	<R 5G6	%478 < 5= > >@B&A B74%	%
VC 95	<R 5#	%478 47 7 %5 7 7 5	%
VC 95	<R 5#	%478 47 7 %5 7 7 75	%
VC 95$	<R 5#$	%478 47 7 %5 7 7 &	%
VC 95G	<R 5#G	%478 47 7 %5 7 7 78 @78@<7=	%
VC 95#	<R 5##	%478 47 7 %5 7 7 78 @78@7A78	%
VC 95H	<R 5#H	%478 47 7 %5 A7??47='>7&	%
VC 95"	<R 5#"	%478 47 7 %5 @78>7@&?	%
VC 95	<R 5#	%478 47 7 %5 @78%78?4<	%
VC 95!	<R 5#!	%478 47 7 %5 @78 5?	%
VC 95	<R 5#	%478 47 7 %5 @78 %4&	%
VC 957	<R 5#7	%478 47 7 %5 @78 % 8	%
VC 95B	<R 5#B	%478 47 7 %5 @78 47%%7 7	%
VC 95	<R 5#	%478 47 7 %5 %47=%47?47%	%
VC 959	<R 5#9	%478 47 7 %5 =8?4748%	%
VC 96	<R 5H	%478 98'8% X5 &	%
VC 96	<R 5H	%478 98'8% &=5	%
VC 96$	<R 5H$	%478 98'8% % &	%
VC 96G	<R 5HG	%478 98'8% %4 55	%
VC 96#	<R 5H#	%478 98'8% 6&<	%
VC 96H	<R 5HH	%478 98'8% 68 5	%
VC 96"	<R 5H"	%478 98'8% 8	%
VC 96	<R 5H	%478 98'8% 5 5=	%

#!= =. ''	(''	%	
VC 96!	<R 5H!	%478 98'8% 58'4%	%
VC 96	<R 5H	%478 98'8% =8=5	%
VC 57		47='<A ?8>5&'	?
VC 57$		47='<A 7=' ?8>5&'	?
VC 57G		47='<A ?8>5&' 8&	?
VC 57#		47='<A =85<=	?
VC 57H		47='<A =85<= K85<K	?
VC 57"		47='<A =85<= 485<4	?
VC 57		47='<A 98?5<9	?
VC 57!		47='<A 7=' 98?5<9	?
VC 57		47='<A 85<A	?
VC 577		47='<A 85<A ?8>5&'	?
VC 57B		47='<A 85<A @85<@	?
VC 57		47='<A 85<A)85<B	?
VC 579		47='<A 85<A 8&	?
VC 575		47='<A 85<A %85<%	?
VC 576		47='<A 85<A)485<6	?
VC 5B		47='<A 85<A 485<4	?
VC 5B		47='<A @85<@	?
VC 5B$		47='<A)85<B	?
VC 5BG		47='<A 7=')85<B	?
VC 5B#		47='<A)85<B 8&	?
VC 5BH		47='<A 8&	?
VC 5B"		47='<A 7=' 8&	?
VC 5B		47='<A 85<='	?
VC 5B!		47='<A K85<K	?
VC 5B		47='<A 7=' K85<K	?
VC 5B7		47='<A 85<	?
VC 5BB		47='<A ?485<I	?
VC 5B		47='<A %85<%	?
VC 5B9		47='<A)485<6	?
VC 5B5		47='<A 485<4	?
VC 5B6		47='<A 7	?
VC 5		47='<A 75	?
VC 5		47='<A >7	?
VC 5 $		47='<A >75	?
VC 5 G		47='<A 5&	?
VC 5 #		47='<A 5	?

#!= =. ''	(''	%	
VC 5 H		47='<A >5&	?
VC 5 "		47='<A >5	?
VC 5		47='<A &	?
VC 5 !		47='<A 7	?
VC 5		47='<A 75	?
VC 5 7		47='<A &5	?
VC 5 B		47='<A >&	?
VC 5		47='<A <	?
VC 5 9		47='<A 5&	?
VC 5 5		47='<A 5	?
VC 5 6		47='<A 8	?
VC 59		47='<A ><	?
VC 59		47='<A 5<	?
VC 59$		47='<A >8	?
VC 59G		47='<A 8	?
VC 59#		47='<A K&=' 5&=' ?8>5&'	?
VC 59H		47='<A K&=' 5&=' 7=' ?8>5&'	?
VC 59"		47='<A K&=' 5&=' ?8>5&' 8&	?
VC 59		47='<A K&=' 5&=' =85<=	?
VC 59!		47='<A K&=' 5&=' =85<= K85<K	?
VC 59		47='<A K&=' 5&=' =85<= 485<4	?
VC 597		47='<A K&=' 5&=' 98?5<9	?
VC 59B		47='<A K&=' 5&=' 85<A	?
VC 59		47='<A K&=' 5&=' 85<A ?8>5&'	?
VC 599		47='<A K&=' 5&=' 85<A @85<@	?
VC 595		47='<A K&=' 5&=' 85<A)85<B	?
VC 596		47='<A K&=' 5&=' 85<A 8&	?
VC 55		47='<A K&=' 5&=' 85<A %85<%	?
VC 55		47='<A K&=' 5&=' 85<A)485<6	?
VC 55$		47='<A K&=' 5&=' 85<A 485<4	?
VC 55G		47='<A K&=' 5&=' @85<@	?
VC 55#		47='<A K&=' 5&=')85<B	?
VC 55H		47='<A K&=' 5&=')85<B 8&	?
VC 55"		47='<A K&=' 5&=' 8&	?
VC 55		47='<A K&=' 5&=' 7=' 8&	?
VC 55!		47='<A K&=' 5&=' 85<='	?
VC 55		47='<A K&=' 5&=' K85<K	?
VC 557		47='<A K&=' 5&=' 85<	?

#!= =. ''	(''	%	
VC 55B		47='<A K&=' 5&=' ?485<I	?
VC 55		47='<A K&=' 5&=' %85<%	?
VC 559		47='<A K&=' 5&=')485<6	?
VC 555		47='<A K&=' 5&=' 485<4	?
VC 556		47='<A 85<A >5& 8= 485<4	?
VC 56		47='<A <=?>5&='5<@ @85<@	?
VC 56		47='<A <=?>5&='5<@)85<B	?
VC 56$		47='<A)7= 8&	?
VC 56G		47='<A ??&'K8 97A 8= 85<='	?
VC 56#		47='<A <=?>5&='5<@)485<6	?
VC 56H		47='<A >5& 8= 485<4	?
VC 56"		47='<A 7 75 7	?
VC 56		47='<A 7 75 75	?
VC 56!		47='<A K&=' 5&=')7= 8&	?
VC 56		47='<A K&=' 5&=' ??&'K8 97A 8= 85<='	?
VC 567		47='<A K&=' 5&=' >5& 8= 485<4	?
VC 566		?& 57= &=	?
VC GB	<R H$	A7%8= 7)8%7A A8'7%< 5 &5	A
VC GB9	<R HG	A7%8= @7AA A8'7%< 5 &5	A
VC GB5	<R !	A7%8= 7)8%7A A5%%5 > 8%4 9875 5 8	A
VC$ 7		< 5= > 5 < 8'=	(
VC$ 7		< 5= > &A&= 8'=	(
VC$ 7$		< 5= > <X58 & 8'=	(
VC$ 7G		< 5= > 6 5= 4 6 7= 8'=	(
VC$ 7#		< 5= > A8 7 8'=	(
VC$ 7H		< 5= > @8AA 8'=	(
VC$ 7"		< 5= > =78 7 8'=	(
VC$ 7		< 5= >)5 5%7 8'=	(
VC$ 7!		< 5= > <)55 8'=	(
VC$ 7		< 5= > &= 8'=	(
VC$ 77		< 5= > =5 45I5A 8'=	(
VC$ 7B		< 5= > 9&=' 8'=	(
VC$ 7	<R$ 7	< 5= > 5< & 8'=	(

Appendix B. Protocol Encoding

Syntactic Conventions

7 (* + * (C+, VC , C
+ * - "/

% C(+ + F(3 + * (+
2

NameofThing
encode-form
...
encode-form

5 + *+ *

6 * + + 2

name: TYPE

+ * 2

N TYPE name

= (* (+ + * +%>)5
6 C*

depth: CARD8

* 2

1 CARD8 depth

6 * , (* 3 (+ * 2

N value name

% 3 (, + = (+ 6 C*
, , D - + /
+ - + (/2

1 0 Error
1 3 code

6 * + + 2

* 2 M % 0 % N

+ * 2

```
N          name
     value1 Name1
     ...
     valueI NameI
```

% 3 (, + = (+ = D
= * * F(+ + 3 (6 C * 2

2 M + + $ $ N

* 2

```
2              class
     0     CopyFromParent
     1     InputOutput
     2     InputOnly
```

6 * + + 2

=7@52 %>)5 " 0 AAA "

+ * 2

```
N     TYPE              NAME
     value1     Alternative1
     ...
     valueI     AlternativeI
```

% 3 3 ((+ , + %>)5
6 C * 2

+ 2 8=9&

* 2

```
4     WINDOW          destination
     0     PointerWindow
     1     InputFocus
```

6 * + + 2

```
value-mask: BITMASK
```

+ * 2

```
N      BITMASK                value-mask
       mask1      mask-name1
       ...
       maskI      mask-nameI
```

% +3+(* E + + *+ += $ # % *
B8%@7? 3+ (+ + -*(, +/
* E C (* C F(%
+ + (* *
+ = * E , , , 3 * E
+ * * , = (,
= (+ * + + , 3 * E
, + +3+(= (

6 A8 % 7A<5 + F(,+ *2

```
   VALUEs
   encode-form
   ...
   encode-form
```

+ * 7A<5 % =7@5 + *E
+ B8%@7? % + 7A<5 , ((
((* + + * + ,*
((+S * ((+ +
3 (+ *

8 3 ((* (+ * , +
, 3 * + (* 3 (+
* * , 3 3 (+ * (* C
3 3 3 * +, (C ,
+ (+ % (3 , 1(
F(3 * (+ ((6 C* 2

```
2       3+n                    request length
4n      LISTofPOINT            points
```

6 ((+ - 3 ((+ + ++ * /
+ * 2

```
   N                 unused
```

8 (* ((+ 3 + * 2

```
   p                 unused, p=pad(E)
```

, 5 * C + +-5/ (* ++ (+
5(*((

```
   pad(E) = (4 - (E mod 4)) mod 4
```

Common Types

A8 % 8 + (* A8 % * * (*
6&& 6&& + S (++
,

5% 6&& 7 , + * E , +

B8%@7 ?2 7 9G$
8=9& 2 7 9G$
)8 @7)2 7 9G$
< & 2 7 9G$
6&=%2 7 9G$
' &=%5 %2 7 9G$
&A& @7)2 7 9G$
9 7 7BA52 7 9G$
6&=%7BA52 7 9G$
7%&@2 7 9G$
8 <7A892 7 9G$
B>%52 ! 3 (
8=%!2 ! +
8=% "2 " +
8=%G$2 G$ +
7 9!2 ! (+
7 9 "2 " (+
7 9G$2 G$ (+
%8@5 %7@)2 7 9G$

```
BITGRAVITY
     0     Forget
     1     NorthWest
     2     North
     3     NorthEast
     4     West
     5     Center
     6     East
     7     SouthWest
     8     South
     9     SouthEast
     10     Static

WINGRAVITY
     0     Unmap
     1     NorthWest
     2     North
```

```
     3     NorthEast
     4     West
     5     Center
     6     East
     7     SouthWest
     8     South
     9     SouthEast
     10     Static

BOOL
     0     False
     1     True

SETofEVENT
     #x00000001     KeyPress
     #x00000002     KeyRelease
     #x00000004     ButtonPress
     #x00000008     ButtonRelease
     #x00000010     EnterWindow
     #x00000020     LeaveWindow
     #x00000040     PointerMotion
     #x00000080     PointerMotionHint
     #x00000100     Button1Motion
     #x00000200     Button2Motion
     #x00000400     Button3Motion
     #x00000800     Button4Motion
     #x00001000     Button5Motion
     #x00002000     ButtonMotion
     #x00004000     KeymapState
     #x00008000     Exposure
     #x00010000     VisibilityChange
     #x00020000     StructureNotify
     #x00040000     ResizeRedirect
     #x00080000     SubstructureNotify
     #x00100000     SubstructureRedirect
     #x00200000     FocusChange
     #x00400000     PropertyChange
     #x00800000     ColormapChange
     #x01000000     OwnerGrabButton
     #xFE000000     unused but must be zero

SETofPOINTEREVENT
     encodings are the same as for SETofEVENT, except with
     #xFFFF8003     unused but must be zero

SETofDEVICEEVENT
     encodings are the same as for SETofEVENT, except with
     #xFFFFC0B0     unused but must be zero

KEYSYM: CARD32
KEYCODE: CARD8
BUTTON: CARD8

SETofKEYBUTMASK
```

```
     #x0001     Shift
     #x0002     Lock
     #x0004     Control
     #x0008     Mod1
     #x0010     Mod2
     #x0020     Mod3
     #x0040     Mod4
     #x0080     Mod5
     #x0100     Button1
     #x0200     Button2
     #x0400     Button3
     #x0800     Button4
     #x1000     Button5
     #xE000     unused but must be zero

SETofKEYMASK
     encodings are the same as for SETofKEYBUTMASK, except with
     #xFF00          unused but must be zero
STRING8: LISTofCARD8
STRING16: LISTofCHAR2B

CHAR2B
     1     CARD8     byte1
     1     CARD8     byte2

POINT
     2     INT16     x
     2     INT16     y

RECTANGLE
     2     INT16     x
     2     INT16     y
     2     CARD16    width
     2     CARD16    height

ARC
     2     INT16     x
     2     INT16     y
     2     CARD16    width
     2     CARD16    height
     2     INT16     angle1
     2     INT16     angle2

HOST
     1                          family
           0         Internet
           1         DECnet
           2         Chaos
           5         ServerInterpreted
           6         InternetV6
     1                          unused
     2      n                   length of address
     n      LISTofBYTE          address
     p                          unused, p=pad(n)
```

STR

1	n	length of name in bytes
n	STRING8	name

Errors

Request

1	0	Error
1	1	code
2	CARD16	sequence number
4		unused
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Value

1	0	Error
1	2	code
2	CARD16	sequence number
4	<32-bits>	bad value
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Window

1	0	Error
1	3	code
2	CARD16	sequence number
4	CARD32	bad resource id
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Pixmap

1	0	Error
1	4	code
2	CARD16	sequence number
4	CARD32	bad resource id
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Atom

1	0	Error
1	5	code
2	CARD16	sequence number
4	CARD32	bad atom id
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Cursor

1	0	Error
1	6	code
2	CARD16	sequence number
4	CARD32	bad resource id
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Font

1	0	Error
1	7	code
2	CARD16	sequence number
4	CARD32	bad resource id
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Match

1	0	Error
1	8	code
2	CARD16	sequence number
4		unused
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Drawable

1	0	Error
1	9	code
2	CARD16	sequence number
4	CARD32	bad resource id
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Access

1	0	Error
1	10	code
2	CARD16	sequence number
4		unused
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Alloc

1	0	Error
1	11	code
2	CARD16	sequence number
4		unused
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Colormap

1	0	Error
1	12	code
2	CARD16	sequence number
4	CARD32	bad resource id
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

GContext

1	0	Error
1	13	code
2	CARD16	sequence number
4	CARD32	bad resource id
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

IDChoice

1	0	Error
1	14	code
2	CARD16	sequence number
4	CARD32	bad resource id
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Name

1	0	Error
1	15	code
2	CARD16	sequence number
4		unused
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Length

1	0	Error
1	16	code
2	CARD16	sequence number
4		unused
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Implementation

1	0	Error
1	17	code
2	CARD16	sequence number
4		unused
2	CARD16	minor opcode
1	CARD8	major opcode
21		unused

Keyboards

?5> &95 3 (, - + $H"/

?5> >@ 3 (, VC 3 + 3 +

% * + + + +?5> >@ 3 (+ 7 +C
7 ? *5 +

Pointers

B<%%&= 3 ((* + ,

Predefined Atoms

PRIMARY	1	WM_NORMAL_HINTS	40
SECONDARY	2	WM_SIZE_HINTS	41
ARC	3	WM_ZOOM_HINTS	42
ATOM	4	MIN_SPACE	43
BITMAP	5	NORM_SPACE	44
CARDINAL	6	MAX_SPACE	45
COLORMAP	7	END_SPACE	46
CURSOR	8	SUPERSCRIPT_X	47
CUT_BUFFER0	9	SUPERSCRIPT_Y	48
CUT_BUFFER1	10	SUBSCRIPT_X	49
CUT_BUFFER2	11	SUBSCRIPT_Y	50
CUT_BUFFER3	12	UNDERLINE_POSITION	51
CUT_BUFFER4	13	UNDERLINE_THICKNESS	52
CUT_BUFFER5	14	STRIKEOUT_ASCENT	53
CUT_BUFFER6	15	STRIKEOUT_DESCENT	54
CUT_BUFFER7	16	ITALIC_ANGLE	55
DRAWABLE	17	X_HEIGHT	56
FONT	18	QUAD_WIDTH	57
INTEGER	19	WEIGHT	58
PIXMAP	20	POINT_SIZE	59
POINT	21	RESOLUTION	60
RECTANGLE	22	COPYRIGHT	61
RESOURCE_MANAGER	23	NOTICE	62
RGB_COLOR_MAP	24	FONT_NAME	63
RGB_BEST_MAP	25	FAMILY_NAME	64
RGB_BLUE_MAP	26	FULL_NAME	65
RGB_DEFAULT_MAP	27	CAP_HEIGHT	66
RGB_GRAY_MAP	28	WM_CLASS	67
RGB_GREEN_MAP	29	WM_TRANSIENT_FOR	68
RGB_RED_MAP	30		
STRING	31		
VISUALID	32		
WINDOW	33		
WM_COMMAND	34		
WM_HINTS	35		
WM_CLIENT_MACHINE	36		

```
WM_ICON_NAME        37
WM_ICON_SIZE        38
WM_NAME             39
```

Connection Setup

6 %) + 3 (* + * +
3 + = + " R = 6
95 + 3 (* + * +
3 + = + 1 * +
.] . , + * = C *]
+]

8 * (2

```
1                       byte-order
     #x42     MSB first
     #x6C     LSB first
1                       unused
2     CARD16            protocol-major-version
2     CARD16            protocol-minor-version
2     n                 length of authorization-protocol-name
2     d                 length of authorization-protocol-data
2                       unused
n     STRING8           authorization-protocol-name
p                       unused, p=pad(n)
d     STRING8           authorization-protocol-data
q                       unused, q=pad(d)
```

5C , C + " + G$ F(
*(* + , + + + " +
G$ F((+ 3 , * + , +

8 * 3 + (+2

```
1     0                 Failed
1     n                 length of reason in bytes
2     CARD16            protocol-major-version
2     CARD16            protocol-minor-version
2     (n+p)/4           length in 4-byte units of "additional data"
n     STRING8           reason
p                       unused, p=pad(n)
```

8 * 3 + ((F(+2

```
1     2                 Authenticate
5                       unused
2     (n+p)/4           length in 4-byte units of "additional data"
n     STRING8           reason
p                       unused, p=pad(n)
```

8 * 3 + +2

```
     1     1                              Success
     1                                    unused
     2     CARD16                         protocol-major-version
     2     CARD16                         protocol-minor-version
     2     8+2n+(v+p+m)/4                 length in 4-byte units of
                                          "additional data"
     4     CARD32                         release-number
     4     CARD32                         resource-id-base
     4     CARD32                         resource-id-mask
     4     CARD32                         motion-buffer-size
     2     v                              length of vendor
     2     CARD16                         maximum-request-length
     1     CARD8                          number of SCREENs in roots
     1     n                              number for FORMATs in
                                          pixmap-formats
     1                                    image-byte-order
          0     LSBFirst
          1     MSBFirst
     1                                    bitmap-format-bit-order
          0     LeastSignificant
          1     MostSignificant
     1     CARD8                          bitmap-format-scanline-unit
     1     CARD8                          bitmap-format-scanline-pad
     1     KEYCODE                        min-keycode
     1     KEYCODE                        max-keycode
     4                                    unused
     v     STRING8                        vendor
     p                                    unused, p=pad(v)
     8n     LISTofFORMAT                  pixmap-formats
     m     LISTofSCREEN                   roots (m is always a multiple of 4)


FORMAT
     1     CARD8                          depth
     1     CARD8                          bits-per-pixel
     1     CARD8                          scanline-pad
     5                                    unused


SCREEN
     4     WINDOW                         root
     4     COLORMAP                       default-colormap
     4     CARD32                         white-pixel
     4     CARD32                         black-pixel
     4     SETofEVENT                     current-input-masks
     2     CARD16                         width-in-pixels
     2     CARD16                         height-in-pixels
     2     CARD16                         width-in-millimeters
     2     CARD16                         height-in-millimeters
     2     CARD16                         min-installed-maps
     2     CARD16                         max-installed-maps
     4     VISUALID                       root-visual
     1                                    backing-stores
```

```
          0     Never
          1     WhenMapped
          2     Always
     1     BOOL                          save-unders
     1     CARD8                         root-depth
     1     CARD8                         number of DEPTHs in allowed-depths
     n     LISTofDEPTH                   allowed-depths (n is always a
                                         multiple of 4)


DEPTH
     1     CARD8                         depth
     1                                   unused
     2     n                             number of VISUALTYPES in visuals
     4                                   unused
     24n     LISTofVISUALTYPE            visuals


VISUALTYPE
     4     VISUALID                      visual-id
     1                                   class
          0     StaticGray
          1     GrayScale
          2     StaticColor
          3     PseudoColor
          4     TrueColor
          5     DirectColor
     1     CARD8                         bits-per-rgb-value
     2     CARD16                        colormap-entries
     4     CARD32                        red-mask
     4     CARD32                        green-mask
     4     CARD32                        blue-mask
     4                                   unused
```

Requests

CreateWindow

```
     1     1                             opcode
     1     CARD8                         depth
     2     8+n                           request length
     4     WINDOW                        wid
     4     WINDOW                        parent
     2     INT16                         x
     2     INT16                         y
     2     CARD16                        width
     2     CARD16                        height
     2     CARD16                        border-width
     2                                   class
          0     CopyFromParent
          1     InputOutput
          2     InputOnly
     4     VISUALID                      visual
          0     CopyFromParent
```

```
    4     BITMASK                         value-mask (has n bits set to 1)
         #x00000001     background-pixmap
         #x00000002     background-pixel
         #x00000004     border-pixmap
         #x00000008     border-pixel
         #x00000010     bit-gravity
         #x00000020     win-gravity
         #x00000040     backing-store
         #x00000080     backing-planes
         #x00000100     backing-pixel
         #x00000200     override-redirect
         #x00000400     save-under
         #x00000800     event-mask
         #x00001000     do-not-propagate-mask
         #x00002000     colormap
         #x00004000     cursor
    4n     LISTofVALUE                   value-list

  VALUEs
    4     PIXMAP                         background-pixmap
         0     None
         1     ParentRelative
    4     CARD32                         background-pixel
    4     PIXMAP                         border-pixmap
         0     CopyFromParent
    4     CARD32                         border-pixel
    1     BITGRAVITY                     bit-gravity
    1     WINGRAVITY                     win-gravity
    1                                    backing-store
         0     NotUseful
         1     WhenMapped
         2     Always
    4     CARD32                         backing-planes
    4     CARD32                         backing-pixel
    1     BOOL                           override-redirect
    1     BOOL                           save-under
    4     SETofEVENT                     event-mask
    4     SETofDEVICEEVENT               do-not-propagate-mask
    4     COLORMAP                       colormap
         0     CopyFromParent
    4     CURSOR                         cursor
         0     None
```

ChangeWindowAttributes

```
    1     2                              opcode
    1                                    unused
    2     3+n                            request length
    4     WINDOW                         window
    4     BITMASK                        value-mask (has n bits set to 1)
         encodings are the same as for CreateWindow
    4n     LISTofVALUE                   value-list
         encodings are the same as for CreateWindow
```

GetWindowAttributes

```
     1      3                              opcode
     1                                     unused
     2      2                              request length
     4      WINDOW                         window

#
     1      1                              Reply
     1                                     backing-store
          0      NotUseful
          1      WhenMapped
          2      Always
     2      CARD16                         sequence number
     4      3                              reply length
     4      VISUALID                       visual
     2                                     class
          1      InputOutput
          2      InputOnly
     1      BITGRAVITY                     bit-gravity
     1      WINGRAVITY                     win-gravity
     4      CARD32                         backing-planes
     4      CARD32                         backing-pixel
     1      BOOL                           save-under
     1      BOOL                           map-is-installed
     1                                     map-state
          0      Unmapped
          1      Unviewable
          2      Viewable
     1      BOOL                           override-redirect
     4      COLORMAP                       colormap
          0      None
     4      SETofEVENT                     all-event-masks
     4      SETofEVENT                     your-event-mask
     2      SETofDEVICEEVENT               do-not-propagate-mask
     2                                     unused

DestroyWindow
     1      4                              opcode
     1                                     unused
     2      2                              request length
     4      WINDOW                         window

DestroySubwindows
     1      5                              opcode
     1                                     unused
     2      2                              request length
     4      WINDOW                         window

ChangeSaveSet
     1      6                              opcode
     1                                     mode
          0      Insert
          1      Delete
     2      2                              request length
     4      WINDOW                         window
```

ReparentWindow

1	7	opcode
1		unused
2	4	request length
4	WINDOW	window
4	WINDOW	parent
2	INT16	x
2	INT16	y

MapWindow

1	8	opcode
1		unused
2	2	request length
4	WINDOW	window

MapSubwindows

1	9	opcode
1		unused
2	2	request length
4	WINDOW	window

UnmapWindow

1	10	opcode
1		unused
2	2	request length
4	WINDOW	window

UnmapSubwindows

1	11	opcode
1		unused
2	2	request length
4	WINDOW	window

ConfigureWindow

1	12	opcode
1		unused
2	3+n	request length
4	WINDOW	window
2	BITMASK	value-mask (has n bits set to 1)
	#x0001 x	
	#x0002 y	
	#x0004 width	
	#x0008 height	
	#x0010 border-width	
	#x0020 sibling	
	#x0040 stack-mode	
2	unused	
4n	LISTofVALUE	value-list

VALUEs

2	INT16	x
2	INT16	y
2	CARD16	width

```
     2      CARD16                          height
     2      CARD16                          border-width
     4      WINDOW                          sibling
     1                                      stack-mode
          0      Above
          1      Below
          2      TopIf
          3      BottomIf
          4      Opposite
```

CirculateWindow

```
     1      13                              opcode
     1                                      direction
          0      RaiseLowest
          1      LowerHighest
     2      2                               request length
     4      WINDOW                          window
```

GetGeometry

```
     1      14                              opcode
     1                                      unused
     2      2                               request length
     4      DRAWABLE                        drawable

#
     1      1                               Reply
     1      CARD8                           depth
     2      CARD16                          sequence number
     4      0                               reply length
     4      WINDOW                          root
     2      INT16                           x
     2      INT16                           y
     2      CARD16                          width
     2      CARD16                          height
     2      CARD16                          border-width
     10                                     unused
```

QueryTree

```
     1      15                              opcode
     1                                      unused
     2      2                               request length
     4      WINDOW                          window

#
     1      1                               Reply
     1                                      unused
     2      CARD16                          sequence number
     4      n                               reply length
     4      WINDOW                          root
     4      WINDOW                          parent
          0      None
     2      n                               number of WINDOWs in children
     14                                     unused
     4n      LISTofWINDOW                   children
```

InternAtom

```
     1      16                              opcode
     1      BOOL                            only-if-exists
     2      2+(n+p)/4                       request length
     2      n                               length of name
     2                                      unused
     n      STRING8                         name
     p                                      unused, p=pad(n)

#
     1      1                               Reply
     1                                      unused
     2      CARD16                          sequence number
     4      0                               reply length
     4      ATOM                            atom
            0      None
     20                                     unused
```

GetAtomName

```
     1      17                              opcode
     1                                      unused
     2      2                               request length
     4      ATOM                            atom

#
     1      1                               Reply
     1                                      unused
     2      CARD16                          sequence number
     4      (n+p)/4                         reply length
     2      n                               length of name
     22                                     unused
     n      STRING8                         name
     p                                      unused, p=pad(n)
```

ChangeProperty

```
     1      18                              opcode
     1                                      mode
          0      Replace
          1      Prepend
          2      Append
     2       6+(n+p)/4                      request length
     4      WINDOW                          window
     4      ATOM                            property
     4      ATOM                            type
     1      CARD8                           format
     3                                      unused
     4      CARD32                          length of data in format units
                    (= n for format = 8)
                    (= n/2 for format = 16)
                    (= n/4 for format = 32)
     n      LISTofBYTE                      data
                    (n is a multiple of 2 for format = 16)
                    (n is a multiple of 4 for format = 32)
```

```
     p                                  unused, p=pad(n)


DeleteProperty
     1     19                           opcode
     1                                  unused
     2     3                            request length
     4     WINDOW                       window
     4     ATOM                         property

GetProperty
     1     20                           opcode
     1     BOOL                         delete
     2     6                            request length
     4     WINDOW                       window
     4     ATOM                         property
     4     ATOM                         type
          0     AnyPropertyType
     4     CARD32                       long-offset
     4     CARD32                       long-length

#
     1     1                            Reply
     1     CARD8                        format
     2     CARD16                       sequence number
     4     (n+p)/4                      reply length
     4     ATOM                         type
          0     None
     4     CARD32                       bytes-after
     4     CARD32                       length of value in format units
                    (= 0 for format = 0)
                    (= n for format = 8)
                    (= n/2 for format = 16)
                    (= n/4 for format = 32)
     12                                 unused
     n     LISTofBYTE                   value
                    (n is zero for format = 0)
                    (n is a multiple of 2 for format = 16)
                    (n is a multiple of 4 for format = 32)
     p                                  unused, p=pad(n)

ListProperties
     1     21                           opcode
     1                                  unused
     2     2                            request length
     4     WINDOW                       window

#
     1     1                            Reply
     1                                  unused
     2     CARD16                       sequence number
     4     n                            reply length
     2     n                            number of ATOMs in atoms
     22                                 unused
```

```
     4n     LISTofATOM                    atoms

SetSelectionOwner
     1      22                            opcode
     1                                    unused
     2      4                             request length
     4      WINDOW                        owner
           0      None
     4      ATOM                          selection
     4      TIMESTAMP                     time
           0      CurrentTime

GetSelectionOwner
     1      23                            opcode
     1                                    unused
     2      2                             request length
     4      ATOM                          selection

#
     1      1                             Reply
     1                                    unused
     2      CARD16                        sequence number
     4      0                             reply length
     4      WINDOW                        owner
           0      None
     20                                   unused

ConvertSelection
     1      24                            opcode
     1                                    unused
     2      6                             request length
     4      WINDOW                        requestor
     4      ATOM                          selection
     4      ATOM                          target
     4      ATOM                          property
           0      None
     4      TIMESTAMP                     time
           0      CurrentTime

SendEvent
     1      25                            opcode
     1      BOOL                          propagate
     2      11                            requestlength
     4      WINDOW                        destination
           0      PointerWindow
           1      InputFocus
     4      SETofEVENT                    event-mask
     32                                   event
           standard event format (see the Events section)

GrabPointer
     1      26                            opcode
     1      BOOL                          owner-events
     2      6                             request length
```

```
      4     WINDOW                          grab-window
      2     SETofPOINTEREVENT               event-mask
      1                                     pointer-mode
            0     Synchronous
            1     Asynchronous
      1                                     keyboard-mode
            0     Synchronous
            1     Asynchronous
      4     WINDOW                          confine-to
            0     None
      4     CURSOR                          cursor
            0     None
      4     TIMESTAMP                       time
            0     CurrentTime

#
      1     1                               Reply
      1                                     status
            0     Success
            1     AlreadyGrabbed
            2     InvalidTime
            3     NotViewable
            4     Frozen
      2     CARD16                          sequence number
      4     0                               reply length
      24                                    unused

UngrabPointer
      1     27                              opcode
      1                                     unused
      2     2                               request length
      4     TIMESTAMP                       time
            0     CurrentTime

GrabButton
      1     28                              opcode
      1     BOOL                            owner-events
      2     6                               request length
      4     WINDOW                          grab-window
      2     SETofPOINTEREVENT               event-mask
      1                                     pointer-mode
            0     Synchronous
            1     Asynchronous
      1                                     keyboard-mode
            0     Synchronous
            1     Asynchronous
      4     WINDOW                          confine-to
            0     None
      4     CURSOR                          cursor
            0     None
      1     BUTTON                          button
            0     AnyButton
      1                                     unused
      2     SETofKEYMASK                    modifiers
```

```
          #x8000                          AnyModifier

UngrabButton
     1     29                             opcode
     1     BUTTON                         button
          0     AnyButton
     2     3                              request length
     4     WINDOW                         grab-window
     2     SETofKEYMASK                   modifiers
          #x8000                          AnyModifier
     2                                    unused

ChangeActivePointerGrab
     1     30                             opcode
     1                                    unused
     2     4                              request length
     4     CURSOR                         cursor
          0     None
     4     TIMESTAMP                      time
          0     CurrentTime
     2     SETofPOINTEREVENT              event-mask
     2                                    unused

GrabKeyboard
     1     31                             opcode
     1     BOOL                           owner-events
     2     4                              request length
     4     WINDOW                         grab-window
     4     TIMESTAMP                      time
          0     CurrentTime
     1                                    pointer-mode
          0     Synchronous
          1     Asynchronous
     1                                    keyboard-mode
          0     Synchronous
          1     Asynchronous
     2                                    unused

#
     1     1                              Reply
     1                                    status
          0     Success
          1     AlreadyGrabbed
          2     InvalidTime
          3     NotViewable
          4     Frozen
     2     CARD16                         sequence number
     4     0                              reply length
     24                                   unused

UngrabKeyboard
     1     32                             opcode
     1                                    unused
     2     2                              request length
```

```
     4      TIMESTAMP                       time
            0      CurrentTime

GrabKey
     1      33                              opcode
     1      BOOL                            owner-events
     2      4                               request length
     4      WINDOW                          grab-window
     2      SETofKEYMASK                    modifiers
            #x8000      AnyModifier
     1      KEYCODE                         key
            0      AnyKey
     1                                      pointer-mode
            0      Synchronous
            1      Asynchronous
     1                                      keyboard-mode
            0      Synchronous
            1      Asynchronous
     3                                      unused

UngrabKey
     1      34                              opcode
     1      KEYCODE                         key
            0      AnyKey
     2      3                               request length
     4      WINDOW                          grab-window
     2      SETofKEYMASK                    modifiers
            #x8000      AnyModifier
     2                                      unused

AllowEvents
     1      35                              opcode
     1                                      mode
            0      AsyncPointer
            1      SyncPointer
            2      ReplayPointer
            3      AsyncKeyboard
            4      SyncKeyboard
            5      ReplayKeyboard
            6      AsyncBoth
            7      SyncBoth
     2      2                               request length
     4      TIMESTAMP                       time
            0      CurrentTime

GrabServer
     1      36                              opcode
     1                                      unused
     2      1                               request length

UngrabServer
     1      37                              opcode
     1                                      unused
     2      1                               request length
```

```
QueryPointer
     1     38                              opcode
     1                                     unused
     2     2                               request length
     4     WINDOW                          window

#
     1     1                               Reply
     1     BOOL                            same-screen
     2     CARD16                          sequence number
     4     0                               reply length
     4     WINDOW                          root
     4     WINDOW                          child
          0     None
     2     INT16                           root-x
     2     INT16                           root-y
     2     INT16                           win-x
     2     INT16                           win-y
     2     SETofKEYBUTMASK                 mask
     6                                     unused

GetMotionEvents
     1     39                              opcode
     1                                     unused
     2     4                               request length
     4     WINDOW                          window
     4     TIMESTAMP                       start
          0     CurrentTime
     4     TIMESTAMP                       stop
          0     CurrentTime

#
     1     1                               Reply
     1                                     unused
     2     CARD16                          sequence number
     4     2n                              reply length
     4     n                               number of TIMECOORDs in events
     20                                    unused
     8n     LISTofTIMECOORD                events

  TIMECOORD
     4     TIMESTAMP                       time
     2     INT16                           x
     2     INT16                           y

TranslateCoordinates
     1     40                              opcode
     1                                     unused
     2     4                               request length
     4     WINDOW                          src-window
     4     WINDOW                          dst-window
     2     INT16                           src-x
     2     INT16                           src-y
```

```
#
     1      1                              Reply
     1      BOOL                           same-screen
     2      CARD16                         sequence number
     4      0                              reply length
     4      WINDOW                         child
           0      None
     2      INT16                          dst-x
     2      INT16                          dst-y
     16                                    unused

WarpPointer
     1      41                             opcode
     1                                     unused
     2      6                              request length
     4      WINDOW                         src-window
           0      None
     4      WINDOW                         dst-window
           0      None
     2      INT16                          src-x
     2      INT16                          src-y
     2      CARD16                         src-width
     2      CARD16                         src-height
     2      INT16                          dst-x
     2      INT16                          dst-y

SetInputFocus
     1      42                             opcode
     1                                     revert-to
           0      None
           1      PointerRoot
           2      Parent
     2      3                              request length
     4      WINDOW                         focus
           0      None
           1      PointerRoot
     4      TIMESTAMP                      time
           0      CurrentTime

GetInputFocus
     1      43                             opcode
     1                                     unused
     2      1                              request length

#
     1      1                              Reply
     1                                     revert-to
           0      None
           1      PointerRoot
           2      Parent
     2      CARD16                         sequence number
     4      0                              reply length
     4      WINDOW                         focus
           0      None
```

```
          1     PointerRoot
     20                                  unused

QueryKeymap
     1     44                            opcode
     1                                   unused
     2     1                             request length

#
     1     1                             Reply
     1                                   unused
     2     CARD16                        sequence number
     4     2                             reply length
     32     LISTofCARD8                  keys

OpenFont
     1     45                            opcode
     1                                   unused
     2     3+(n+p)/4                     request length
     4     FONT                          fid
     2     n                             length of name
     2                                   unused
     n     STRING8                       name
     p                                   unused, p=pad(n)

CloseFont
     1     46                            opcode
     1                                   unused
     2     2                             request length
     4     FONT                          font

QueryFont
     1     47                            opcode
     1                                   unused
     2     2                             request length
     4     FONTABLE                      font

#
     1     1                             Reply
     1                                   unused
     2     CARD16                        sequence number
     4     7+2n+3m                       reply length
     12     CHARINFO                     min-bounds
     4                                   unused
     12     CHARINFO                     max-bounds
     4                                   unused
     2     CARD16                        min-char-or-byte2
     2     CARD16                        max-char-or-byte2
     2     CARD16                        default-char
     2     n                             number of FONTPROPs in properties
     1                                   draw-direction
          0     LeftToRight
          1     RightToLeft
     1     CARD8                         min-byte1
```

```
     1      CARD8                          max-byte1
     1      BOOL                           all-chars-exist
     2      INT16                          font-ascent
     2      INT16                          font-descent
     4      m                              number of CHARINFOs in char-infos
     8n      LISTofFONTPROP                properties
     12m      LISTofCHARINFO               char-infos

  FONTPROP
     4      ATOM                           name
     4      <32-bits>                  value

  CHARINFO
     2      INT16                          left-side-bearing
     2      INT16                          right-side-bearing
     2      INT16                          character-width
     2      INT16                          ascent
     2      INT16                          descent
     2      CARD16                         attributes

QueryTextExtents
     1      48                             opcode
     1      BOOL                           odd length, True if p = 2
     2      2+(2n+p)/4                     request length
     4      FONTABLE                       font
     2n      STRING16                      string
     p                                     unused, p=pad(2n)

#
     1      1                              Reply
     1                                     draw-direction
          0      LeftToRight
          1      RightToLeft
     2       CARD16                        sequence number
     4       0                             reply length
     2       INT16                         font-ascent
     2       INT16                         font-descent
     2       INT16                         overall-ascent
     2       INT16                         overall-descent
     4       INT32                         overall-width
     4       INT32                         overall-left
     4       INT32                         overall-right
     4                                     unused

ListFonts
     1      49                             opcode
     1                                     unused
     2      2+(n+p)/4                      request length
     2      CARD16                         max-names
     2      n                              length of pattern
     n      STRING8                        pattern
     p                                     unused, p=pad(n)

#
```

```
     1     1                                 Reply
     1                                       unused
     2     CARD16                            sequence number
     4     (n+p)/4                           reply length
     2     CARD16                            number of STRs in names
     22                                      unused
     n     LISTofSTR                         names
     p                                       unused, p=pad(n)

ListFontsWithInfo
     1     50                                opcode
     1                                       unused
     2     2+(n+p)/4                         request length
     2     CARD16                            max-names
     2     n                                 length of pattern
     n     STRING8                           pattern
     p                                       unused, p=pad(n)

# (except for last in series)
     1     1                                 Reply
     1     n                                 length of name in bytes
     2     CARD16                            sequence number
     4     7+2m+(n+p)/4                      reply length
     12     CHARINFO                         min-bounds
     4                                       unused
     12     CHARINFO                         max-bounds
     4                                       unused
     2     CARD16                            min-char-or-byte2
     2     CARD16                            max-char-or-byte2
     2     CARD16                            default-char
     2     m                                 number of FONTPROPs in properties
     1                                       draw-direction
           0     LeftToRight
           1     RightToLeft
     1     CARD8                             min-byte1
     1     CARD8                             max-byte1
     1     BOOL                              all-chars-exist
     2     INT16                             font-ascent
     2     INT16                             font-descent
     4     CARD32                            replies-hint
     8m     LISTofFONTPROP                   properties
     n     STRING8                           name
     p                                       unused, p=pad(n)

  FONTPROP
     encodings are the same as for QueryFont

  CHARINFO
     encodings are the same as for QueryFont

# (last in series)
     1     1                                 Reply
     1     0                                 last-reply indicator
     2     CARD16                            sequence number
```

```
     4      7                              reply length
     52                                    unused

SetFontPath
     1      51                             opcode
     1                                     unused
     2      2+(n+p)/4                      request length
     2      CARD16                         number of STRs in path
     2                                     unused
     n      LISTofSTR                      path
     p                                     unused, p=pad(n)

GetFontPath
     1      52                             opcode
     1                                     unused
     2      1                              request list

#
     1      1                              Reply
     1                                     unused
     2      CARD16                         sequence number
     4      (n+p)/4                        reply length
     2      CARD16                         number of STRs in path
     22                                    unused
     n      LISTofSTR                      path
     p                                     unused, p=pad(n)

CreatePixmap
     1      53                             opcode
     1      CARD8                          depth
     2      4                              request length
     4      PIXMAP                         pid
     4      DRAWABLE                       drawable
     2      CARD16                         width
     2      CARD16                         height

FreePixmap
     1      54                             opcode
     1                                     unused
     2      2                              request length
     4      PIXMAP                         pixmap

CreateGC
     1      55                             opcode
     1                                     unused
     2      4+n                            request length
     4      GCONTEXT                       cid
     4      DRAWABLE                       drawable
     4      BITMASK                        value-mask (has n bits set to 1)
              #x00000001     function
              #x00000002     plane-mask
              #x00000004     foreground
              #x00000008     background
              #x00000010     line-width
```

```
        #x00000020     line-style
        #x00000040     cap-style
        #x00000080     join-style
        #x00000100     fill-style
        #x00000200     fill-rule
        #x00000400     tile
        #x00000800     stipple
        #x00001000     tile-stipple-x-origin
        #x00002000     tile-stipple-y-origin
        #x00004000     font
        #x00008000     subwindow-mode
        #x00010000     graphics-exposures
        #x00020000     clip-x-origin
        #x00040000     clip-y-origin
        #x00080000     clip-mask
        #x00100000     dash-offset
        #x00200000     dashes
        #x00400000     arc-mode
   4n     LISTofVALUE                    value-list

VALUEs
   1                                     function
         0     Clear
         1     And
         2     AndReverse
         3     Copy
         4     AndInverted
         5     NoOp
         6     Xor
         7     Or
         8     Nor
         9     Equiv
        10     Invert
        11     OrReverse
        12     CopyInverted
        13     OrInverted
        14     Nand
        15     Set
   4     CARD32                         plane-mask
   4     CARD32                         foreground
   4     CARD32                         background
   2     CARD16                         line-width
   1                                     line-style
        0     Solid
        1     OnOffDash
        2     DoubleDash
   1                                     cap-style
        0     NotLast
        1     Butt
        2     Round
        3     Projecting
   1                                     join-style
        0     Miter
        1     Round
```

```
        2       Bevel
    1                                   fill-style
        0       Solid
        1       Tiled
        2       Stippled
        3       OpaqueStippled
    1                                   fill-rule
        0       EvenOdd
        1       Winding
    4    PIXMAP                         tile
    4    PIXMAP                         stipple
    2    INT16                          tile-stipple-x-origin
    2    INT16                          tile-stipple-y-origin
    4    FONT                           font
    1                                   subwindow-mode
        0       ClipByChildren
        1       IncludeInferiors
    1    BOOL                           graphics-exposures
    2    INT16                          clip-x-origin
    2    INT16                          clip-y-origin
    4    PIXMAP                         clip-mask
        0       None
    2    CARD16                         dash-offset
    1    CARD8                          dashes
    1                                   arc-mode
        0       Chord
        1       PieSlice
```

ChangeGC

```
    1    56                             opcode
    1                                   unused
    2    3+n                            request length
    4    GCONTEXT                       gc
    4    BITMASK                        value-mask (has n bits set to 1)
        encodings are the same as for CreateGC
    4n     LISTofVALUE                  value-list
        encodings are the same as for CreateGC
```

CopyGC

```
    1    57                             opcode
    1                                   unused
    2    4                              request length
    4    GCONTEXT                       src-gc
    4    GCONTEXT                       dst-gc
    4    BITMASK                        value-mask
        encodings are the same as for CreateGC
```

SetDashes

```
    1    58                             opcode
    1                                   unused
    2    3+(n+p)/4                      request length
    4    GCONTEXT                       gc
    2    CARD16                         dash-offset
    2    n                              length of dashes
```

n	LISTofCARD8	dashes
p		unused, p=pad(n)

SetClipRectangles

1	59	opcode
1		ordering
	0 UnSorted	
	1 YSorted	
	2 YXSorted	
	3 YXBanded	
2	3+2n	request length
4	GCONTEXT	gc
2	INT16	clip-x-origin
2	INT16	clip-y-origin
8n	LISTofRECTANGLE	rectangles

FreeGC

1	60	opcode
1		unused
2	2	request length
4	GCONTEXT	gc

ClearArea

1	61	opcode
1	BOOL	exposures
2	4	request length
4	WINDOW	window
2	INT16	x
2	INT16	y
2	CARD16	width
2	CARD16	height

CopyArea

1	62	opcode
1		unused
2	7	request length
4	DRAWABLE	src-drawable
4	DRAWABLE	dst-drawable
4	GCONTEXT	gc
2	INT16	src-x
2	INT16	src-y
2	INT16	dst-x
2	INT16	dst-y
2	CARD16	width
2	CARD16	height

CopyPlane

1	63	opcode
1		unused
2	8	request length
4	DRAWABLE	src-drawable
4	DRAWABLE	dst-drawable
4	GCONTEXT	gc
2	INT16	src-x

```
     2      INT16                          src-y
     2      INT16                          dst-x
     2      INT16                          dst-y
     2      CARD16                         width
     2      CARD16                         height
     4      CARD32                         bit-plane

PolyPoint
     1      64                             opcode
     1                                     coordinate-mode
          0      Origin
          1      Previous
     2       3+n                           request length
     4      DRAWABLE                       drawable
     4      GCONTEXT                       gc
     4n      LISTofPOINT                   points

PolyLine
     1      65                             opcode
     1                                     coordinate-mode
          0      Origin
          1      Previous
     2       3+n                           request length
     4      DRAWABLE                       drawable
     4      GCONTEXT                       gc
     4n      LISTofPOINT                   points

PolySegment
     1      66                             opcode
     1                                     unused
     2      3+2n                           request length
     4      DRAWABLE                       drawable
     4      GCONTEXT                       gc
     8n      LISTofSEGMENT                 segments

  SEGMENT
     2      INT16                          x1
     2      INT16                          y1
     2      INT16                          x2
     2      INT16                          y2

PolyRectangle
     1      67                             opcode
     1                                     unused
     2      3+2n                           request length
     4      DRAWABLE                       drawable
     4      GCONTEXT                       gc
     8n      LISTofRECTANGLE               rectangles

PolyArc
     1      68                             opcode
     1                                     unused
     2      3+3n                           request length
     4      DRAWABLE                       drawable
```

```
     4      GCONTEXT                    gc
     12n      LISTofARC                 arcs
```

FillPoly

```
     1      69                          opcode
     1                                  unused
     2      4+n                         request length
     4      DRAWABLE                    drawable
     4      GCONTEXT                    gc
     1                                  shape
          0      Complex
          1      Nonconvex
          2      Convex
     1                                  coordinate-mode
          0      Origin
          1      Previous
     2                                  unused
     4n       LISTofPOINT               points
```

PolyFillRectangle

```
     1      70                          opcode
     1                                  unused
     2      3+2n                        request length
     4      DRAWABLE                    drawable
     4      GCONTEXT                    gc
     8n       LISTofRECTANGLE           rectangles
```

PolyFillArc

```
     1      71                          opcode
     1                                  unused
     2      3+3n                        request length
     4      DRAWABLE                    drawable
     4      GCONTEXT                    gc
     12n      LISTofARC                 arcs
```

PutImage

```
     1      72                          opcode
     1                                  format
          0      Bitmap
          1      XYPixmap
          2      ZPixmap
     2       6+(n+p)/4                  request length
     4      DRAWABLE                    drawable
     4      GCONTEXT                    gc
     2      CARD16                      width
     2      CARD16                      height
     2      INT16                       dst-x
     2      INT16                       dst-y
     1      CARD8                       left-pad
     1      CARD8                       depth
     2                                  unused
     n      LISTofBYTE                  data
     p                                  unused, p=pad(n)
```

GetImage

1	73	opcode
1		format
	1 XYPixmap	
	2 ZPixmap	
2	5	request length
4	DRAWABLE	drawable
2	INT16	x
2	INT16	y
2	CARD16	width
2	CARD16	height
4	CARD32	plane-mask

#

1	1	Reply
1	CARD8	depth
2	CARD16	sequence number
4	(n+p)/4	reply length
4	VISUALID	visual
	0 None	
20		unused
n	LISTofBYTE	data
p		unused, p=pad(n)

PolyText8

1	74	opcode
1		unused
2	4+(n+p)/4	request length
4	DRAWABLE	drawable
4	GCONTEXT	gc
2	INT16	x
2	INT16	y
n	LISTofTEXTITEM8	items
p		unused, p=pad(n) (p is always 0 or 1)

TEXTITEM8

1	m	length of string (cannot be 255)
1	INT8	delta
m	STRING8	string

or

1	255	font-shift indicator
1		font byte 3 (most-significant)
1		font byte 2
1		font byte 1
1		font byte 0 (least-significant)

PolyText16

1	75	opcode
1		unused
2	4+(n+p)/4	request length
4	DRAWABLE	drawable
4	GCONTEXT	gc
2	INT16	x

```
    2     INT16                          y
    n     LISTofTEXTITEM16               items
    p                                    unused, p=pad(n)  (p must be 0 or
                                         1)

  TEXTITEM16
    1     m                              number of CHAR2Bs in string
                                         (cannot be 255)
    1     INT8                           delta
    2m     STRING16                      string
  or
    1     255                            font-shift indicator
    1                                    font byte 3 (most-significant)
    1                                    font byte 2
    1                                    font byte 1
    1                                    font byte 0 (least-significant)
```

ImageText8

```
    1     76                             opcode
    1     n                              length of string
    2     4+(n+p)/4                      request length
    4     DRAWABLE                       drawable
    4     GCONTEXT                       gc
    2     INT16                          x
    2     INT16                          y
    n     STRING8                        string
    p                                    unused, p=pad(n)
```

ImageText16

```
    1     77                             opcode
    1     n                              number of CHAR2Bs in string
    2     4+(2n+p)/4                     request length
    4     DRAWABLE                       drawable
    4     GCONTEXT                       gc
    2     INT16                          x
    2     INT16                          y
    2n     STRING16                      string
    p                                    unused, p=pad(2n)
```

CreateColormap

```
    1     78                             opcode
    1                                    alloc
         0     None
         1     All
    2     4                              request length
    4     COLORMAP                       mid
    4     WINDOW                         window
    4     VISUALID                       visual
```

FreeColormap

```
    1     79                             opcode
    1                                    unused
    2     2                              request length
    4     COLORMAP                       cmap
```

CopyColormapAndFree

1	80	opcode
1		unused
2	3	request length
4	COLORMAP	mid
4	COLORMAP	src-cmap

InstallColormap

1	81	opcode
1		unused
2	2	request length
4	COLORMAP	cmap

UninstallColormap

1	82	opcode
1		unused
2	2	request length
4	COLORMAP	cmap

ListInstalledColormaps

1	83	opcode
1		unused
2	2	request length
4	WINDOW	window

#

1	1	Reply
1		unused
2	CARD16	sequence number
4	n	reply length
2	n	number of COLORMAPs in cmaps
22		unused
4n	LISTofCOLORMAP	cmaps

AllocColor

1	84	opcode
1		unused
2	4	request length
4	COLORMAP	cmap
2	CARD16	red
2	CARD16	green
2	CARD16	blue
2		unused

#

1	1	Reply
1		unused
2	CARD16	sequence number
4	0	reply length
2	CARD16	red
2	CARD16	green
2	CARD16	blue
2		unused

```
     4      CARD32                          pixel
     12                                     unused

AllocNamedColor
     1      85                              opcode
     1                                      unused
     2      3+(n+p)/4                       request length
     4      COLORMAP                        cmap
     2      n                               length of name
     2                                      unused
     n      STRING8                         name
     p                                      unused, p=pad(n)

#
     1      1                               Reply
     1                                      unused
     2      CARD16                          sequence number
     4      0                               reply length
     4      CARD32                          pixel
     2      CARD16                          exact-red
     2      CARD16                          exact-green
     2      CARD16                          exact-blue
     2      CARD16                          visual-red
     2      CARD16                          visual-green
     2      CARD16                          visual-blue
     8                                      unused

AllocColorCells
     1      86                              opcode
     1      BOOL                            contiguous
     2      3                               request length
     4      COLORMAP                        cmap
     2      CARD16                          colors
     2      CARD16                          planes

#
     1      1                               Reply
     1                                      unused
     2      CARD16                          sequence number
     4      n+m                             reply length
     2      n                               number of CARD32s in pixels
     2      m                               number of CARD32s in masks
     20                                     unused
     4n      LISTofCARD32                   pixels
     4m      LISTofCARD32                   masks

AllocColorPlanes
     1      87                              opcode
     1      BOOL                            contiguous
     2      4                               request length
     4      COLORMAP                        cmap
     2      CARD16                          colors
     2      CARD16                          reds
     2      CARD16                          greens
```

```
     2     CARD16                          blues

#
     1     1                               Reply
     1                                     unused
     2     CARD16                          sequence number
     4     n                               reply length
     2     n                               number of CARD32s in pixels
     2                                     unused
     4     CARD32                          red-mask
     4     CARD32                          green-mask
     4     CARD32                          blue-mask
     8                                     unused
     4n     LISTofCARD32                   pixels
```

FreeColors

```
     1     88                              opcode
     1                                     unused
     2     3+n                             request length
     4     COLORMAP                        cmap
     4     CARD32                          plane-mask
     4n     LISTofCARD32                   pixels
```

StoreColors

```
     1     89                              opcode
     1                                     unused
     2     2+3n                            request length
     4     COLORMAP                        cmap
     12n     LISTofCOLORITEM               items

  COLORITEM
     4     CARD32                          pixel
     2     CARD16                          red
     2     CARD16                          green
     2     CARD16                          blue
     1                                     do-red, do-green, do-blue
          #x01     do-red (1 is True, 0 is False)
          #x02     do-green (1 is True, 0 is False)
          #x04     do-blue (1 is True, 0 is False)
          #xF8     unused
     1                                     unused
```

StoreNamedColor

```
     1     90                              opcode
     1                                     do-red, do-green, do-blue
          #x01     do-red (1 is True, 0 is False)
          #x02     do-green (1 is True, 0 is False)
          #x04     do-blue (1 is True, 0 is False)
          #xF8     unused
     2     4+(n+p)/4                       request length
     4     COLORMAP                        cmap
     4     CARD32                          pixel
     2     n                               length of name
     2                                     unused
```

```
     n      STRING8                    name
     p                                 unused, p=pad(n)

QueryColors
     1      91                         opcode
     1                                 unused
     2      2+n                        request length
     4      COLORMAP                   cmap
     4n      LISTofCARD32              pixels

#
     1      1                          Reply
     1                                 unused
     2      CARD16                     sequence number
     4      2n                         reply length
     2      n                          number of RGBs in colors
     22                                unused
     8n      LISTofRGB                 colors

  RGB
     2      CARD16                     red
     2      CARD16                     green
     2      CARD16                     blue
     2                                 unused

LookupColor
     1      92                         opcode
     1                                 unused
     2      3+(n+p)/4                  request length
     4      COLORMAP                   cmap
     2      n                          length of name
     2                                 unused
     n      STRING8                    name
     p                                 unused, p=pad(n)

#
     1      1                          Reply
     1                                 unused
     2      CARD16                     sequence number
     4      0                          reply length
     2      CARD16                     exact-red
     2      CARD16                     exact-green
     2      CARD16                     exact-blue
     2      CARD16                     visual-red
     2      CARD16                     visual-green
     2      CARD16                     visual-blue
     12                                unused

CreateCursor
     1      93                         opcode
     1                                 unused
     2      8                          request length
     4      CURSOR                     cid
     4      PIXMAP                     source
```

```
     4      PIXMAP                          mask
            0      None
     2      CARD16                          fore-red
     2      CARD16                          fore-green
     2      CARD16                          fore-blue
     2      CARD16                          back-red
     2      CARD16                          back-green
     2      CARD16                          back-blue
     2      CARD16                          x
     2      CARD16                          y
```

CreateGlyphCursor

```
     1      94                              opcode
     1                                      unused
     2      8                               request length
     4      CURSOR                          cid
     4      FONT                            source-font
     4      FONT                            mask-font
            0      None
     2      CARD16                          source-char
     2      CARD16                          mask-char
     2      CARD16                          fore-red
     2      CARD16                          fore-green
     2      CARD16                          fore-blue
     2      CARD16                          back-red
     2      CARD16                          back-green
     2      CARD16                          back-blue
```

FreeCursor

```
     1      95                              opcode
     1                                      unused
     2      2                               request length
     4      CURSOR                          cursor
```

RecolorCursor

```
     1      96                              opcode
     1                                      unused
     2      5                               request length
     4      CURSOR                          cursor
     2      CARD16                          fore-red
     2      CARD16                          fore-green
     2      CARD16                          fore-blue
     2      CARD16                          back-red
     2      CARD16                          back-green
     2      CARD16                          back-blue
```

QueryBestSize

```
     1      97                              opcode
     1                                      class
            0      Cursor
            1      Tile
            2      Stipple
     2      3                               request length
     4      DRAWABLE                        drawable
```

```
     2      CARD16                          width
     2      CARD16                          height

#
     1      1                               Reply
     1                                      unused
     2      CARD16                          sequence number
     4      0                               reply length
     2      CARD16                          width
     2      CARD16                          height
     20                                     unused

QueryExtension
     1      98                              opcode
     1                                      unused
     2      2+(n+p)/4                       request length
     2      n                               length of name
     2                                      unused
     n      STRING8                         name
     p                                      unused, p=pad(n)

#
     1      1                               Reply
     1                                      unused
     2      CARD16                          sequence number
     4      0                               reply length
     1      BOOL                            present
     1      CARD8                           major-opcode
     1      CARD8                           first-event
     1      CARD8                           first-error
     20                                     unused

ListExtensions
     1      99                              opcode
     1                                      unused
     2      1                               request length

#
     1      1                               Reply
     1      CARD8                           number of STRs in names
     2      CARD16                          sequence number
     4      (n+p)/4                         reply length
     24                                     unused
     n      LISTofSTR                       names
     p                                      unused, p=pad(n)

ChangeKeyboardMapping
     1      100                             opcode
     1      n                               keycode-count
     2      2+nm                            request length
     1      KEYCODE                         first-keycode
     1      m                               keysyms-per-keycode
     2                                      unused
     4nm      LISTofKEYSYM                  keysyms
```

GetKeyboardMapping

```
     1     101                               opcode
     1                                       unused
     2     2                                 request length
     1     KEYCODE                           first-keycode
     1     m                                 count
     2                                       unused

#
     1     1                                 Reply
     1     n                                 keysyms-per-keycode
     2     CARD16                            sequence number
     4     nm                                reply length (m = count field
                                             from the request)
     24                                      unused
     4nm     LISTofKEYSYM                    keysyms
```

ChangeKeyboardControl

```
     1     102                               opcode
     1                                       unused
     2     2+n                               request length
     4     BITMASK                           value-mask (has n bits set to 1)
           #x0001     key-click-percent
           #x0002     bell-percent
           #x0004     bell-pitch
           #x0008     bell-duration
           #x0010     led
           #x0020     led-mode
           #x0040     key
           #x0080     auto-repeat-mode
     4n     LISTofVALUE                      value-list

  VALUEs
     1     INT8                              key-click-percent
     1     INT8                              bell-percent
     2     INT16                             bell-pitch
     2     INT16                             bell-duration
     1     CARD8                             led
     1                                       led-mode
           0     Off
           1     On
     1     KEYCODE                           key
     1                                       auto-repeat-mode
           0     Off
           1     On
           2     Default
```

GetKeyboardControl

```
     1     103                               opcode
     1                                       unused
     2     1                                 request length

#
```

```
     1      1                              Reply
     1                                     global-auto-repeat
          0      Off
          1      On
     2      CARD16                         sequence number
     4      5                              reply length
     4      CARD32                         led-mask
     1      CARD8                          key-click-percent
     1      CARD8                          bell-percent
     2      CARD16                         bell-pitch
     2      CARD16                         bell-duration
     2                                     unused
     32      LISTofCARD8                   auto-repeats

Bell
     1      104                            opcode
     1      INT8                           percent
     2      1                              request length

ChangePointerControl
     1      105                            opcode
     1                                     unused
     2      3                              request length
     2      INT16                          acceleration-numerator
     2      INT16                          acceleration-denominator
     2      INT16                          threshold
     1      BOOL                           do-acceleration
     1      BOOL                           do-threshold

GetPointerControl
     1      106                            opcode
     1                                     unused
     2      1                              request length

#
     1      1                              Reply
     1                                     unused
     2      CARD16                         sequence number
     4      0                              reply length
     2      CARD16                         acceleration-numerator
     2      CARD16                         acceleration-denominator
     2      CARD16                         threshold
     18                                    unused

SetScreenSaver
     1      107                            opcode
     1                                     unused
     2      3                              request length
     2      INT16                          timeout
     2      INT16                          interval
     1                                     prefer-blanking
          0      No
          1      Yes
          2      Default
```

```
     1                                   allow-exposures
          0      No
          1      Yes
          2      Default
     2                                   unused

GetScreenSaver
     1      108                          opcode
     1                                   unused
     2      1                            request length

#
     1      1                            Reply
     1                                   unused
     2      CARD16                       sequence number
     4      0                            reply length
     2      CARD16                       timeout
     2      CARD16                       interval
     1                                   prefer-blanking
          0      No
          1      Yes
     1                                   allow-exposures
          0      No
          1      Yes
     18                                  unused

ChangeHosts
     1      109                          opcode
     1                                   mode
          0      Insert
          1      Delete
     2      2+(n+p)/4                    request length
     1                                   family
          0      Internet
          1      DECnet
          2      Chaos
     1                                   unused
     2      n                            length of address
     n      LISTofCARD8                  address
     p                                   unused, p=pad(n)

ListHosts
     1      110                          opcode
     1                                   unused
     2      1                            request length

#
     1      1                            Reply
     1                                   mode
          0      Disabled
          1      Enabled
     2      CARD16                       sequence number
     4      n/4                          reply length
     2      CARD16                       number of HOSTs in hosts
```

```
     22                                  unused
     n     LISTofHOST                    hosts (n always a multiple of 4)

SetAccessControl
     1     111                           opcode
     1                                   mode
          0     Disable
          1     Enable
     2     1                             request length

SetCloseDownMode
     1     112                           opcode
     1                                   mode
          0     Destroy
          1     RetainPermanent
          2     RetainTemporary
     2     1                             request length

KillClient
     1     113                           opcode
     1                                   unused
     2     2                             request length
     4     CARD32                        resource
          0     AllTemporary

RotateProperties
     1     114                           opcode
     1                                   unused
     2     3+n                           request length
     4     WINDOW                        window
     2     n                             number of properties
     2     INT16                         delta
     4n    LISTofATOM                    properties

ForceScreenSaver
     1     115                           opcode
     1                                   mode
          0     Reset
          1     Activate
     2     1                             request length

SetPointerMapping
     1     116                           opcode
     1     n                             length of map
     2     1+(n+p)/4                     request length
     n     LISTofCARD8                   map
     p                                   unused, p=pad(n)

#
     1     1                             Reply
     1                                   status
          0     Success
          1     Busy
     2     CARD16                        sequence number
```

```
     4      0                              reply length
     24                                    unused

GetPointerMapping
     1      117                            opcode
     1                                     unused
     2      1                              request length

#
     1      1                              Reply
     1      n                              length of map
     2      CARD16                         sequence number
     4      (n+p)/4                        reply length
     24                                    unused
     n      LISTofCARD8                    map
     p                                     unused, p=pad(n)

SetModifierMapping
     1      118                            opcode
     1      n                              keycodes-per-modifier
     2      1+2n                           request length
     8n     LISTofKEYCODE                  keycodes

#
     1      1                              Reply
     1                                     status
          0      Success
          1      Busy
          2      Failed
     2       CARD16                       sequence number
     4       0                            reply length
     24                                   unused

GetModifierMapping
     1      119                            opcode
     1                                     unused
     2      1                              request length

#
     1      1                              Reply
     1      n                              keycodes-per-modifier
     2      CARD16                         sequence number
     4      2n                             reply length
     24                                    unused
     8n      LISTofKEYCODE                 keycodes

NoOperation
     1      127                            opcode
     1                                     unused
     2      1+n                            request length
     4n                                    unused
```

Events

KeyPress

1	2	code
1	KEYCODE	detail
2	CARD16	sequence number
4	TIMESTAMP	time
4	WINDOW	root
4	WINDOW	event
4	WINDOW	child
0	None	
2	INT16	root-x
2	INT16	root-y
2	INT16	event-x
2	INT16	event-y
2	SETofKEYBUTMASK	state
1	BOOL	same-screen
1		unused

KeyRelease

1	3	code
1	KEYCODE	detail
2	CARD16	sequence number
4	TIMESTAMP	time
4	WINDOW	root
4	WINDOW	event
4	WINDOW	child
0	None	
2	INT16	root-x
2	INT16	root-y
2	INT16	event-x
2	INT16	event-y
2	SETofKEYBUTMASK	state
1	BOOL	same-screen
1		unused

ButtonPress

1	4	code
1	BUTTON	detail
2	CARD16	sequence number
4	TIMESTAMP	time
4	WINDOW	root
4	WINDOW	event
4	WINDOW	child
0	None	
2	INT16	root-x
2	INT16	root-y
2	INT16	event-x
2	INT16	event-y
2	SETofKEYBUTMASK	state
1	BOOL	same-screen
1		unused

ButtonRelease

1	5	code

```
      1     BUTTON                          detail
      2     CARD16                          sequence number
      4     TIMESTAMP                       time
      4     WINDOW                          root
      4     WINDOW                          event
      4     WINDOW                          child
           0     None
      2     INT16                           root-x
      2     INT16                           root-y
      2     INT16                           event-x
      2     INT16                           event-y
      2     SETofKEYBUTMASK                 state
      1     BOOL                            same-screen
      1                                     unused

MotionNotify
      1     6                               code
      1                                     detail
           0     Normal
           1     Hint
      2     CARD16                          sequence number
      4     TIMESTAMP                       time
      4     WINDOW                          root
      4     WINDOW                          event
      4     WINDOW                          child
           0     None
      2     INT16                           root-x
      2     INT16                           root-y
      2     INT16                           event-x
      2     INT16                           event-y
      2     SETofKEYBUTMASK                 state
      1     BOOL                            same-screen
      1                                     unused

EnterNotify
      1     7                               code
      1                                     detail
           0     Ancestor
           1     Virtual
           2     Inferior
           3     Nonlinear
           4     NonlinearVirtual
      2     CARD16                          sequence number
      4     TIMESTAMP                       time
      4     WINDOW                          root
      4     WINDOW                          event
      4     WINDOW                          child
           0     None
      2     INT16                           root-x
      2     INT16                           root-y
      2     INT16                           event-x
      2     INT16                           event-y
      2     SETofKEYBUTMASK                 state
      1                                     mode
```

```
          0     Normal
          1     Grab
          2     Ungrab
     1                                   same-screen, focus
          #x01     focus (1 is True, 0 is False)
          #x02     same-screen (1 is True, 0 is False)
          #xFC     unused
```

LeaveNotify

```
     1     8                             code
     1                                   detail
          0     Ancestor
          1     Virtual
          2     Inferior
          3     Nonlinear
          4     NonlinearVirtual
     2     CARD16                        sequence number
     4     TIMESTAMP                     time
     4     WINDOW                        root
     4     WINDOW                        event
     4     WINDOW                        child
          0     None
     2     INT16                         root-x
     2     INT16                         root-y
     2     INT16                         event-x
     2     INT16                         event-y
     2     SETofKEYBUTMASK               state
     1                                   mode
          0     Normal
          1     Grab
          2     Ungrab
     1                                   same-screen, focus
          #x01     focus (1 is True, 0 is False)
          #x02     same-screen (1 is True, 0 is False)
          #xFC     unused
```

FocusIn

```
     1     9                             code
     1                                   detail
          0     Ancestor
          1     Virtual
          2     Inferior
          3     Nonlinear
          4     NonlinearVirtual
          5     Pointer
          6     PointerRoot
          7     None
     2     CARD16                        sequence number
     4     WINDOW                        event
     1                                   mode
          0     Normal
          1     Grab
          2     Ungrab
          3     WhileGrabbed
```

23		unused

FocusOut

1	10	code
1		detail
	0 Ancestor	
	1 Virtual	
	2 Inferior	
	3 Nonlinear	
	4 NonlinearVirtual	
	5 Pointer	
	6 PointerRoot	
	7 None	
2	CARD16	sequence number
4	WINDOW	event
1		mode
	0 Normal	
	1 Grab	
	2 Ungrab	
	3 WhileGrabbed	
23		unused

KeymapNotify

1	11	code
31	LISTofCARD8	keys (byte for keycodes 0–7 is omitted)

Expose

1	12	code
1		unused
2	CARD16	sequence number
4	WINDOW	window
2	CARD16	x
2	CARD16	y
2	CARD16	width
2	CARD16	height
2	CARD16	count
14		unused

GraphicsExposure

1	13	code
1		unused
2	CARD16	sequence number
4	DRAWABLE	drawable
2	CARD16	x
2	CARD16	y
2	CARD16	width
2	CARD16	height
2	CARD16	minor-opcode
2	CARD16	count
1	CARD8	major-opcode
11		unused

NoExposure

```
     1      14                              code
     1                                      unused
     2      CARD16                          sequence number
     4      DRAWABLE                        drawable
     2      CARD16                          minor-opcode
     1      CARD8                           major-opcode
     21                                     unused
```

VisibilityNotify

```
     1      15                              code
     1                                      unused
     2      CARD16                          sequence number
     4      WINDOW                          window
     1                                      state
          0      Unobscured
          1      PartiallyObscured
          2      FullyObscured
     23                                     unused
```

CreateNotify

```
     1      16                              code
     1                                      unused
     2      CARD16                          sequence number
     4      WINDOW                          parent
     4      WINDOW                          window
     2      INT16                           x
     2      INT16                           y
     2      CARD16                          width
     2      CARD16                          height
     2      CARD16                          border-width
     1      BOOL                            override-redirect
     9                                      unused
```

DestroyNotify

```
     1      17                              code
     1                                      unused
     2      CARD16                          sequence number
     4      WINDOW                          event
     4      WINDOW                          window
     20                                     unused
```

UnmapNotify

```
     1      18                              code
     1                                      unused
     2      CARD16                          sequence number
     4      WINDOW                          event
     4      WINDOW                          window
     1      BOOL                            from-configure
     19                                     unused
```

MapNotify

```
     1      19                              code
     1                                      unused
     2      CARD16                          sequence number
```

```
     4      WINDOW                          event
     4      WINDOW                          window
     1      BOOL                            override-redirect
     19                                     unused

MapRequest
     1      20                              code
     1                                      unused
     2      CARD16                          sequence number
     4      WINDOW                          parent
     4      WINDOW                          window
     20                                     unused

ReparentNotify
     1      21                              code
     1                                      unused
     2      CARD16                          sequence number
     4      WINDOW                          event
     4      WINDOW                          window
     4      WINDOW                          parent
     2      INT16                           x
     2      INT16                           y
     1      BOOL                            override-redirect
     11                                     unused

ConfigureNotify
     1      22                              code
     1                                      unused
     2      CARD16                          sequence number
     4      WINDOW                          event
     4      WINDOW                          window
     4      WINDOW                          above-sibling
          0      None
     2      INT16                           x
     2      INT16                           y
     2      CARD16                          width
     2      CARD16                          height
     2      CARD16                          border-width
     1      BOOL                            override-redirect
     5                                      unused

ConfigureRequest
     1      23                              code
     1                                      stack-mode
          0      Above
          1      Below
          2      TopIf
          3      BottomIf
          4      Opposite
     2      CARD16                          sequence number
     4      WINDOW                          parent
     4      WINDOW                          window
     4      WINDOW                          sibling
          0      None
```

```
     2      INT16                          x
     2      INT16                          y
     2      CARD16                         width
     2      CARD16                         height
     2      CARD16                         border-width
     2      BITMASK                        value-mask
          #x0001     x
          #x0002     y
          #x0004     width
          #x0008     height
          #x0010     border-width
          #x0020     sibling
          #x0040     stack-mode
     4                                     unused
```

GravityNotify

```
     1      24                             code
     1                                     unused
     2      CARD16                         sequence number
     4      WINDOW                         event
     4      WINDOW                         window
     2      INT16                          x
     2      INT16                          y
     16                                    unused
```

ResizeRequest

```
     1      25                             code
     1                                     unused
     2      CARD16                         sequence number
     4      WINDOW                         window
     2      CARD16                         width
     2      CARD16                         height
     20                                    unused
```

CirculateNotify

```
     1      26                             code
     1                                     unused
     2      CARD16                         sequence number
     4      WINDOW                         event
     4      WINDOW                         window
     4      WINDOW                         unused
     1                                     place
          0      Top
          1      Bottom
     15                                    unused
```

CirculateRequest

```
     1      27                             code
     1                                     unused
     2      CARD16                         sequence number
     4      WINDOW                         parent
     4      WINDOW                         window
     4                                     unused
     1                                     place
```

```
          0     Top
          1     Bottom
     15                                   unused

PropertyNotify
     1     28                             code
     1                                    unused
     2     CARD16                         sequence number
     4     WINDOW                         window
     4     ATOM                           atom
     4     TIMESTAMP                      time
     1                                    state
          0     NewValue
          1     Deleted
     15                                   unused

SelectionClear
     1     29                             code
     1                                    unused
     2     CARD16                         sequence number
     4     TIMESTAMP                      time
     4     WINDOW                         owner
     4     ATOM                           selection
     16                                   unused

SelectionRequest
     1     30                             code
     1                                    unused
     2     CARD16                         sequence number
     4     TIMESTAMP                      time
          0     CurrentTime
     4     WINDOW                         owner
     4     WINDOW                         requestor
     4     ATOM                           selection
     4     ATOM                           target
     4     ATOM                           property
          0     None
     4                                    unused

SelectionNotify
     1     31                             code
     1                                    unused
     2     CARD16                         sequence number
     4     TIMESTAMP                      time
          0     CurrentTime
     4     WINDOW                         requestor
     4     ATOM                           selection
     4     ATOM                           target
     4     ATOM                           property
          0     None
     8                                    unused

ColormapNotify
     1     32                             code
```

```
     1                                   unused
     2      CARD16                       sequence number
     4      WINDOW                       window
     4      COLORMAP                     colormap
          0      None
     1      BOOL                         new
     1                                   state
          0      Uninstalled
          1      Installed
     18                                  unused

ClientMessage
     1      33                           code
     1      CARD8                        format
     2      CARD16                       sequence number
     4      WINDOW                       window
     4      ATOM                         type
     20                                  data

MappingNotify
     1      34                           code
     1                                   unused
     2      CARD16                       sequence number
     1                                   request
          0      Modifier
          1      Keyboard
          2      Pointer
     1      KEYCODE                      first-keycode
     1      CARD8                        count
     25                                  unused
```

Glossary

7 * *, * (
B + (* + +
+ 3 (+
* 3 *
* * * (D * *
++ * * %
* * + + (D
* ++ 3 + 3 (

7 3 7 3 , E + (, +

7 8 7 7

7 * 7 * (F(89 + * 7 *
(+ + +

B E (+ 7 , +, 3 E (+ , +
+ C* , +, 3
3 + + 3 , (*
, E (+

B E 3 * , +, C
3+ E , E

B 3 , +, D+ , +,
+ ++ 8 F(3
3 (* , +,
- ((*+/ % , +,
* , +, E , 3

B C* , +, (E *
* +

B * 7 * +

B + 7 , +, 3 + F(E
(+ , +, 7 C* +
+ + 3 (* *
+ 5C (3 3 + +

B(B(* 3 +
(+ 3 +

B + 6 * - C* 0 * /+ 3 +
+ + , + 3 + *(,
6
+ + + 3 ,

+ % + , +, 3 (, +,

7 * , + , * 3
* **((%)
+ * * (% * +
, + , * 3 @
**(S *, *(
3 3 , + *(
(* + *
* *

8 *
+ (((, + , %
* + + * +

* 7 * + 3 (%
* + , , + , (+ +
, + ,S C 3 (+ C *
+('B 3 (+ 3 (* 9 +
+, * * * * +
* , + , + , * +
,

% **(, 3 +
* E , 7 *
- (/ 3 3
, F(+ 3

* 7 , + , : ; , + , 3 , +
(, 3 ,
+ , 3 % +
, + , (+ + , + , * %
: ; , + , , + , (

+ * % + * C D + > C
3 , O P (+
* C + + , C 5
, + , + C* , + * 6 ,
+ , + + + (

(7 (3 8
(* * +
% (+ + , + , 3
, , + ,

9 % + , + , C* (* C
% + C +
+ , (+ 1(, ((

9 3 ? + * E (C +
3 E , (+ 3 %
+ , , + 3 : E +; + : ;

9 * , C 3 (+
* + (+ + C %
(+ + C +(+ 3 (%

+ (+ + C + +((
3 (% + (+ + C + +(
3 (% 'B 3 (+ + *

9 7 3 , + (+ 3 + +

9 , B , + , + C* (+ (+ +
% , + , + C*
3 E , + , 4 , 3 ,
+ , (+ (+

53 * + * (*
3 % 3 + (
* + 3 + F(53
(+ % 3 3 + 3 (
E + * +
3 4 , 3 3
53 + 3 , + ,

53 * E 53 F(+ 3 , + , % 3
F(3 , + , + + (+
3 * E

53 D % + , + *(C
+ 3 3 - (+ + , +
E + 3 (+ , * ++ , + ,
* * / % 3 D * *
, (+ 3 3

53 9 3 + 3 * (, + ,
, + , (* C +
+ 3 (3 + + + C

53 (% , + , (+ 3 +
3

5C (3 3 + (3 , + ,
, , + , (+ (+ 5C (3
* * ,
, + , 3

5C = * + C + + C +
* 5C ((F((+ 3
+ C +

6 (, + , % (, + , *

6 7 * C - / %
+ %
* + 3 ((+ + C 7
++ * * + * +

' ' C ' + C 3

'	7 *
'	? + E E + (+ 3 + C (3 (8 + + (+ * (+ + 3 ((+, +, * * * 3 ((
' C	(* ((+ C ((+ C E (+ C , + + 7 C (+ , + , 3 * + * + C
' 3	+ * *
'	$ 3 , + + , + + (3 (3 * F((+(+ % 3 (+ + *
4	7 (+ + (+ + +
8+	7 + (F(3 (+, ((* (% + (+ 3
8	% , +, (, +, + , 2 + + L + +
8 ((	% ((* , +, + E + (8 + E + 3 , (+ * + , +, 3 + * & , 3 +, (, +, % (((E + 3 + + + + ((, +, + * E , +, , 3 E + 3
8 (*	3 E + (3 + + (*
8 (& , +,	7 + $, +, , +, (+ F(+ $, +, 3 + (+ (((3 + + $, +, 3 + , +,
8 (&((, +,	7 + , +, * E + F(, +, (+ (+ ((+ , +, 3 + + + $, +,
?	? E + 3 + E E + E + 3 +

? +
7 3 E + +E 3
, 3 , (+
* 3

? *
7 + * E E +

@ +
7 , + , + * + * *+
< * +, + , + 3 3 ,
3

@ + E
@ (4 7 * 7
A E A E + * E +*+ E

@ *
@ * ,
, *

& (
7 , + , (+ * , + , (
+, 7 (, +, B 3 ,
, +, 7 E + +
+ + (+ + 7
+ + (+ + B = + ,
(+ (+ 7 , +, + (+
+ (+ , +, (+ +
3 3

& (+
7 , + , (+ + * , +, (+ +,
7 (+ , +, B * + 7
E + + + + (+ +
7 + + (+ + B
= + , (+ + (7
, +, + (+ + (

) ++
* ++ + + * *
* F(((+ %
* * (

) , +,
8))

) 3
' E (3 % 3
, E ((+

) C 3 (
7 C = 3 (, = (*
(+ (, +, C* - = +
, +, C* / 6 , +, C 3 (+C
* + 3 (+ +

) C*
7 C* +* 7 C*
* (, +* C ,
C 3 (* -$^=/ +, = +
-D C / C* 7 C* (E
= *

)
C* , +, (E *
* +

) * E
' + (
+ 7 * E * E+

, * + + % * E +
C

) % + 3 + (+
E +

) 7 3 % (+
* 3 ,
3 , (+ * 3

) + 3 7 + 3 * (* +
3 , 3 + * * % 3
(+ + + E , 3
+ 3 +

) + , * 3 + ,
* + * + * + %
% + +
(* * * 6 C *
* (* (D
* * + * , , + , *

) % , + , 3
+ + , + ,

) (+ * , C 3 (
+ C * +(+ + + + (
3 (S * 3 , + - 'B
3 (/ % 'B 3 (+ + *

+ + , * - * / * , ,
+ , (3 (, *
D , + , *
+ + + (
* +

8 * F(+ * E
, B 3 + *(C +
* @ F(+
(* F(*(

F(7 ** + 3 + F(8 E
+ 3

(+ , C* (C +
* E , (% 3 (F(+
+ , * * (% *
((((+ + * 3
, (, +

'B 3 (+ + (- 'B/ 3 ((+ +
% 3 (, + " (+
(* , * *(* + "HHGH
* C *(* % 3 3 (*
+ +,

'

% C* * C *
, 3 + , , (+ , C*
* C , + % , + ,
, + , (+ , , + , , +

, + , 5 , + , 3 8
(+ (* + (, (+ + ,
+ , 7 , + ,

3 % 3 L , + ,
L , + ,
(+ + + + (+ * +
((* + 3 (+ , + ,
* 3 + , + , * *
*

7 C 3 (3 , + D
, - 3 (3 * + / * ,
3 (+ + C +

+ 7 * + +
+ + +

7 3 3 + 3 + + ,
3 + + * % , (+
C + (, E + +
+ *

7 (+ , +
* S 3 +
3 * + * - : , ; / 7
(+ ((-
(* + / 3
(, + , ((
E
: ; % (+
* + 6 C *
: (E + ; +
(* * ,
* (+ > * X *
% (+
* +S C * E : E ; -
+ + /
C % (+
(% + *

3 % 3 3 + , + , * * 8 +
* *(C F(
+ + *(C (E

3 % 3 + C (3 (
% 3 F(*
(* + %
((+ (* (
C (F(+ 3

+ * , + , E , ,
+ ,

E + , + , * E + , 3
, + , (+ (+ , , + ,
% * + E % ,
, + , E , E +

3 , + +
, 'B 3 (+ + + +

' $ 3 , + +
, 3 (+ + + + % 3 (
*

7 * (+
, 3 ++ * E ,
(+

5F(3 %, 8 & A % 8='! 3 (+ + F(
* + + F(
F(3 , 2 + * 3 ("H (3
- :7; :X; / , F(3 + * 3 (
$$ (3 - : ; :D; / + * 3 ($
$ # (3 - :7 3 ; :& + ; / ,
F(3 + * 3 ($$# $#" (3 - :
3 ; : + ; / + + * 3 ($ " $$$ (3
- :& F(; :%4& =; / , F(3
+ * 3 ($#" $H# (3 - : F(;
: ; /

% 7 C* + , + *
% C* E ,

% * * 7 * * * 3 (C + * + 8
* 3 % * * 3 (
, (+ - (# + / % 3 3 (
* + * * % , *
* * * *
* % + * *
* % & * * 3 (- * +
) / 3 + 3 % 3 (
3 + (F((3 *

% ( ) 3 , + +
, (+ C 3 (+ +
+ 'B 3 (S * + +
+ 'B 3 (% 3 (
*

% 7 * (+ +
+ % * (+ 3
+

, 7 , + , 3 , + * +
% + * , + , (

3 ' F(* + , + , ,
3 , (((, + (3
* E

7 , + , 3 * E
(S , + , 3 , +
(+ + , + ,

+ , 3 , + , D + (, + , * + (
* 3 * , + , %
(, + , * E , ,
+ , 3

+ , * @ (, + , + *((
- / 3 + + , + , *

>6 * % + C* + > * D +
* + 3 +(,
* *
+

X6 * % + C* + X * D +
C 3 (+

Index

A

7 ! !H
7 3 !H
E + G"
GG G"
7 "
7
7)
7 = * +
7 ,53 G!
7 !H
7 * $!H
+ + G!
7(D $

B

B E (+ $ H !H
B E " !H
B
B
3 $" !H
!H
B * !H
* H
B + !H
B(
GH !H
(*
B( ) !H
B(!H
B + $!H

C

7 3) ' G"
' H#
4 !
? +
? +@ "
) !
) $
3 $#
+ ,7 ($
+ $! !H
(= "
(F("
(+ , $!
7 H
!"
@ !
HG !"
6 #G
* " !"
"
* =
(= #
(F(H
(+ , $H
$!"
!#
$
* !"
3 G$
+ * !"
!"
7 H
* 7 +6 "!
' HH
) H!
* "
(G
' #!
' (G
= G
) C* #!
+ , !
(% * $
(G !"

D

9) G
9 !"
9 = G
9 (, + , $G
9 + , $G
9 3 !"
9 !"
9 !
9 , !

E

5 = !"
5 +
7 "
7 "
7 * "
* "
("
9 , "
C
6 "
' C "
89 "
8* * "

A
@
= *
) C*
F(
(
+ ,
5
+ GH
*
53 !H !
+ H
5C (!
C
*
* E $!
$!
+ G$
(!H !
D !
5C
5C !
+
3
H
F(H

F

6 (HG
6) "$
6 (, + , !
6 (8 !!
6 (&(!!
6 #G !
6 3 !
6 * "!
6
6 (#
6 ' H"
6) C* #!

G

' !
- ' C /
' C !
- ' C /
' 7 *= * $
' 6) #!
' ' * $!
' 8* "#
' 8 (6 (#$
' ? + !
' ? +@
' @ + @ "
' @ 53 #
') !
') @ !
') G
' 3 !
' &, G$
' + ,7 ($$
' !!
' !!
- 7 3 /
-) 3 /
' B(GH
' ? G
' ? + G"
') GG
' 3 #
' C #! !!
' 5C (
' 3 $" !!
' 3 = H
' !!

H

4 !!

I

8+ !!
8* % C " "
8* % C ! ""
8 !!
8 (+ 3
3 !H
8 ((#$!!
3 !!
8 (* !!
8 * "!
8 7 * $

K

?
G !!
* + - @ + E /
? + !
G" !
? + ! H
? * =
?) ! !H
? !H
? * ! " !
< +
? !G

L

A 3 = !"
A
+ , H H!
A 5C H
A 6 #
A 6 8 #
A 4 !$
A 8 + * "
A) G
A E($

M

@ = #
@ + , + , $# # !
@ = !
@ F(#
@ (, + , $H
@ + , $#
* +
(!
A E !
=(*A E !
@ + E H " !
@ * !
@ = !H

N

= 5C ($
= & !G

O

& (!
& (+ !
& +
* 1
*
& 6 #G

P

) ++ G !
) 3 !
E + G
GH
) C 3 (" !
) C* !
* H
) !
* E # !
)
GG
) + 3
) 7 "
) 6 7 "G
) 6 "$
) A H!
)) H!
) H
) * H
) % C " ""
) % C ! "H
) $
)
) = "
) (+
)(8* "G

Q

I(B D #
I($
I(5C H
I(6 #G
I(? * #$
I( ) #
I(% C 5C #"
I(% $!

R

(#
+
= #
+ , $#

*
F(
+ #
*
H
D F(H
(
89 #
'B 3 (

) G

S

3

+
H
G
"
=
F(
+53 G$
F((*

3
#
7 !G
H"
9 , @ + !G
9 HH
6) #
8 (6 (#$
@ + @ H
) @
3 !
&, G
$
E + $
$
' $
$

= * + $
5F(3 $

T

% $
% * * $
% + #
% ($
% $
%
7 H
7%&@ G
B8%' 7 8%> #
B8%@7 ? G
B&&A #
B<%@7 ? #
B<%%&= #
B>%5 G
7 9 " #
7 9G$ #
7 9! #
47 $B #
&A& @7) G
< & G
95 8 55 5=% #
9 7 7BA5 G
+ G$
5 5=% #
6&=% G
6&=%7BA5 G
' &=%5 % G
4& % H !$
8=% " #
8=%G$ #
8=%! G
?5>B<%@7 ? #
?5> &95 # ! H
?5>@7 ? #
?5> >@ # !
A8 % 6&& G
A8 % 7A<5 G
& G
)8 @7) G
)&8=% #
)&8=%5 5 5=% #
5 %7='A5 #
% 8=' " #
% 8='! #
%8@5 %7@) #
7A<5 G
8 <7A89 G
8=9& G
8=' 7 8%> #

U

< B(GH
< ? G!
< ? + G
<) G#
< 3 #
< * "
< * = G
< * (, + , $H
< * + , $H

V

, $
= $
G
(
* "

W

) #
+ (HG
+ ,
+ !H
3 $" G
8 (& !!
8 (&((!!
* G
!

X

>6 * H G

Z

X6 * H G