;29M;qNA: JBNs!&J,;6OS !?J,;6%7%9%F% `K*1k9bB.DL?.

#42s@80KC#?7:H

1997G/57n8F|!?29F| !IIZ!K

1 JBNs!&J,;6OS(57n8F|J,)

J,;6OS Colonia $r@bL@$9k?$a!"U,;6OS $K4X 9kK\$d!"0JA0$K=q$+l?O@J8$r;29M$K7F4J7i K^HaF_$?!#$3$3$G$O!"$^$:A0H>$GJBNs!"J,;6OS $N35MW$r!"8eH>$G%3%s%T%e!<%?!&3%m%K!<$HColonia $N@bL@$r<($9$3HK9k!#

2 JBNs!&J,;6OS $N35MW

2.1 %W%m%;%9

7W;;5!%7%9%F% `$K$*$$F!"%f!<%6$,0MMj$7$?;E;v$r7W;;5!FbIt$G%f!<%6$KBe$C$F<B9T$9$k2>A[E*$J<BBN$r%W%m%;%9$H$$&!#%W%m%;%9$O!"7W;;5!%7%9%F% `FbItK*$$FG=F0E*$KF0:n$9kbCH$b4pK\E*$J<BBNG"$j!"7W;;5!$G2?i+$N=hM}$r9T$&$K$O%W%m%;%9$KhiJ1lPJiJ!#7?$,$C$F!"%W%m%;%9$O7W;;5!FbK*1k$f!<%6$NBeM}H_J5lk!#%W%m%;%9$O%W%m%0%i% `$N<B9T$KBP1~$7!"$=$NF0:n$O%W%m%0%i% `$K5-=R5l$?FbMF$K=>$&!#

2.2 JBNs=hM}$HJ,;6=hM}

CPU $rJ#?tBfHw$($?%^%k%A%W%m%;%C%5%7%9%F% `$K$*$$F!"%W%m%0%i% `$rF1;~$K8D!9$NCPU >e$G<B9T9k3H$r%^%k%A%W%m%;%C%7%s%0$H$$&!#$^$?!"J#?t$NCPU >e$GJ*M}E*$KF1;~$K=hM}$r9T$&3H$rJBNs=hM}$H$$&!#

J,;6=hM}HO!"J#?t$N7W;;5!$r%M%C%H%o!<%/$G7k9g$7!"8_$$$KDL?.7"$$MxMQ7"$&$h$&$K7?=hM}7ABV$r8@$&!#3lKBP7$F!"#1Bf$N7W;;5!$G=hM}$9$k7ABV$r=8Cf=hM}$H$$&!#

0lHL$K!"JBNs=hM}$O%^%k%A%W%m%;%C%5$N7W;;5!$GJ#?t$NCPU >e$GF1;~$K=hM}$r9T$&$3Hr$$$!"J,;6=hM}$O0[$J$k7W;;5!>e$GF1;~$K=hM}$r9T$&$3Hr$$$&!#7+7J$,$i!"N><T$N:,K\E*$J0c$$$O!"%W%m%;%9$"$k$$$O%W%m%;%C%54V$N5wN%$G$"$k!#5wN%HO!"I=>]E*KO%W%m%;%C%54V$NDL?.CY1d$G$"$k$,!"<B:]$K$OJ*M}E*$J5wN%dG^BNK4Xok3H$,B?$$!#5wN%$,Bg$-$/$Jk3HKhC$F!"8_$$$K:nMQ$r5Z$\$79g$&$N$K;~4V$,$+$+kh$&$KJj!"%7%9%F% `FbN9YF$N%W%m%;%9$,E}0lE*$J%S%e!<$r;}D3H,:FqKJk!#3l$,J,;6=hM}$rFq7/7F$$kBg$-$JM}M3G"$k!#

2.3 J,;6=hM}$NL\E*

2.3.1 >pJs!";q8;$N6&MQ

2f!9$,6&F1$G:n6H$r9T$&>19g!"8_$$$NL)@\$J%3%_%e&K%1!<%7%g&s$,I,MW$G$"$k!#7W;;5!$r;H$C$F:n6H$9$k>19g$O!"8_$$$K>pJs$r8r4r4$9$7!"6&DL$N>pJs!";q8;$K%"%/%;%9$9k3H,G-kh$&!"3F?M$,MxMQ9k7W;;5!$r%M%C%H%o!<%/$G7k9g9k3H$,0lHL$K9Tol$k!#:#F|!"%o!<%/%9%F!<%7%g&s$d%Q%=%3%s$NIa5ZKh$j!":n6H4D6-$N%Q!<%=%J%k2=$OCe<B$K?JsG$$k$,!"%Q!<%=%J%k2=$,?JaP$=$l$@$1J,;6=hM}$NI,MW@-$OA}Bg9k!#$=$b$=$b?M$,J,;6$7$F$$k0J>e!">pJs$bJ,;6$7!"$=$lir6&MQ9k$?$a$N5!9=$,I,MWHJ$k!#>pJs!";q8;$,MF0W$K6&MQ$G$-$k3H!"3l$,J,;6=hM}$NbCHb4pK\E*$JL\E*$G$"$k!#

2.3.2 @-G=$N8~>e

J#?t$N7W;;5!$,MxMQG-kH$-!"#1Bf$N7W;;5!$KM?$(il$?=hM}$N9YFr<B9T5;kNGOJ/!"MxMQ2DG=$J7W;;5!$KJB9T7F=hM}$r<B9T$5$;$?$[$&$,$h$j7W;;5!$NMxMQ8zN($,>e$,$j!"M?$(il$?=hM}$rC;~4V$G<B9T$9k3H,G-$k!#^$?!"Ii2Y$N7Z$7W;;5!$H=E$7W;;5!$,$"C?H-!"Ii2Y$N7Z$$J}Kh$jB?$/$N=hM}$r<B9T5;$?$[$&$,

8z2IE*G"$k!#Ii2Y$NU,;6$O!"%7%9%F%'A4BN$N@-G=8~>e$*$h$S8D!9$N=hM}$N8zN(2=$KIT2D7g$N<jK!$G$"$k!#%W%m%;%C%5$N=hM}G=NO$@1GJ/!"%a%b%j$d%G%#%9%/$N;HMQNLKD$$F$bIi2YJ,;6$N<jK!$,E,MQ$G$-$k!#

2.3.3 ?.Mj@-$N8~>e

J#?t$N7W;;5!$,MxMQG-kH$-!"0l$D$N=hM}$rJB9T<B9T5;kNGOJ/!"F1$8=hM}$rJ#?t$N7W;;5!$K<B9T5;k3HKhj!"%7%9%F%'$K>iD9@-$rb?$;$k3H$,$G$-$k!#3N>l9g!"0lBf$N7W;;5!$K>c32$,H/@8$7Fb!"%M%C%H%o!<%/$G@\B3$5l?B>$N7W;;5!$K=hM}$rBe@o$j$K<B9T5$;k3HKhj!"%7%9%F%'A4BN$N5!G=$rDd;_5;k3HJ$/=hM}$r7QB3$7$F<B9T9k3H$,2DG=$KJk!#9JoA4m81$,J,;6$5$l!"%7%9%F%'A4BN$N2DMQ@-5iKO?.Mj@-$r9b$ak3H,G-ko1G$"$k!#

2.3.4 5,LŒ,MQ@-

%M%C%H%o!<%/$K@\B3$5lk7W;;5!$C0lHL$KFHN)7FF0:n2DG=$G!"$^$?J,;64D6-$KBP1~9k$?$a%7%9%F%'$r9=C[$9$kMWAG$K%b%8%e!<%k@-$r;}$?$;$k3H$,B?$$!#7?$,$C$F!"$"$kItJ,$N5!G=$rJQ99$7$?$j!"?7$7$/5!G=$rDI2C$7$?$j9k3H$,!"=8Cf7?%7%9%F%'$KHfYh$j=@Fp$K9T$($k!#%7%9%F%'$K?7$7$7W;;5!$r@\B3$7$?$j%7%9%F%'<+?H$rJQ99$7$?j9kN$K!"%7%9%F%'A4BN$N:F9=C[$r9T$o$:$K5!G=$r0];}$7DD!"%7%9%F%'H7FN@-G=$,8~>e$9kh$&$GJ1lPJi$J$$!#3&7?%7%9%F%'$N5,LO$Khi$J$$@-<A$r5,LŒ,MQ@-!#9%1!<%i%S%j%F%#!K$H$$&!#

2.4 J,;6OS $N@_7WL\I8

J,;6=hM}$r<B8=$9$k>e$GbCHb=EMW$J35G0$,%M%C%H%o!<%/(B)2a@-!#Network transparency!KG"$k!#%M%C%H%o!<%/(B)2a@-$H$O!"%M%C%H%o!<%/$NB8:_$r0U<1$7$J/$Fbh$$@-<A$r$$&!#%f!<%6$,J*M}E*$JJ,;6rG$-$k8B$j0U<1$;$:K!"A4BN$G01DN%?%$%'%7%j%s07?$N7W;;5!%7%9%F%'Nh$&$KMxMQG-kh$&$K9k3H,=EMWG"$k!#J*M}E*$JJ,;6$r1#$7DD!"O@M}E*KO1Bf$N7W;;5!$r7A@.9k3H!"3l$,J,;6%7%9%F%'$NbCHb4pK\E*$J5!G=$G$"$k!#3&7?MxMQ$r2DG=$K9k3HKhCF!"@h$K=R$Y$?$h$&$JJ,;6=hM}$NMxE@$rM-8z$K@8$+$9$3H,G-!"$^$?$=$NL\E*$rC#@.$9k3H,G-$k!#

2.4.1 %M%C%H%o!<%/(B)2a@-

%M%C%H%o!<%/(B)2a@-$,Jq4^$9$k35G0$K$O<!$Nh&JbN,$"$"$k!#

- 0LCVF)2a@-

  %*%V%8%'%/%H$NB8:_$9$kJ*M}E*0LCV$,0U<1$5$l$J$$!#%*%V%8%'%/%HKBP9$k%"%/%;%9$,$=$NJ*M}E*0LCVHOFHN)$K;XDj$G$-$k3H!#$^$?!"%M%C%H%o!<%/(Bfb$N$I3+iGb3$&$7$?%"%/%;%9$,2DG=G"$k!#

- @-G=0BDj@-

  Ii2Y$NJQF0$KhC$F%7%9%F%'A4BN$N@-G=$,:81&$5lJ$$!#

- F1;~<B9TF)2a@-

  J#?t$N:n6H$,JB9T7F9Tolk3Hr%f!<%6$K0U<1$5lJ$$!#FC$K%*%V%8%'%/%H$N6&M-$K4X$7$F!"F1;~$K<B9T5l$kJ#?t$N=hM}$N43>D$,0U<1$5$l$J$$!#

- >c32F)2a@-

  %O!<%I%&%'%"!"%=%U%H%&%'"$N>c32$,0U<1$5$l$J$$!#>c32$,H/@8$7$?>l9g!"@-G=$O<c43Dc2<7F$b!K5!G=$r0];}G-J/FO%JiJ$$!#

- J#@=F)2a@-

  %*%V%8%'%/%H$,%M%C%H%o!<%/(B)$KJ#@=$r;}$G$F$$$F$bJ,3d$5lF$$$F$b!"$=l,MxMQ<T$+$i8+$F0U<1$5lJ$$!#

- 0\AwF)2a@-

  %*%V%8%'%/%H$N0\Aw$,0U<1$5$l$J$$!#0\Aw$N2aDx$K$"$F!"%f!<%6b7$/$O%"%W%j1!<%7%gs$N=hM}$K1F6A$rM?$(FJ$$!#

- 5,LŒF)2a@-

  %7%9%F%'$d%"%W%j1!<%7%gs$N5,LO$NUQ99$,!"%7%9%F%'$N9=@.$d%"%W%j1!<%7%gs$N%"%k4%j%:'$rJQ99$:K!"$^$?%7%9%F%'$N5!G=$rDd;_$;$:K2DG=$G$"$k3H!#

3liN35G0$O!"C1$K%M%C%H%o!<%/$NB8:_$r0U<1$7$J$$$H$$&%M%C%H%o!<%/F)2a@-hj$+$J$j9-$$0UL#$GB*$(B?bNG"$k!#$7$?$,CF!"%M%C%H%o!<%/F)2a@-$H$$&hj$OJ,;6F)2a@-$JIH8F$VJ}$,$h$$$+b7lJ$$!#

$=$N$[$+!"J,;6OS $r@_7W$9$k>e$G=EMW$H;W$olkMW5aH7$F!"<!$Nh&JbN,$"$2il$k!#

- <+N)@-

  %M%C%H%o!<%/F'b$N:G>.8B$N7W;;5!$G5!G=$,0];}G-$k!#C1BN$N7W;;5!Gb5!G=9k3H$,K>$^$7$$!#

- 6I=jA`:n$N8zN(

  J,;65!G=$N<BAu$KhC$F6I=jE*$JA`:n$N@-G=$,Dc2<$7$J$$!#J,;6OS $H$7$F1?MQ$7$F$b!"A`:nN[HsIO6I=jA`:nG"kH9M$(5i$l$k!#

- :F9=@.$NMF0W@-

  %7%9%F%`$rDd;_$;:$K$^$?8zN(E*$K%7%9%F%`$N9=@.$,JQ$(5i$l$k!#

- %;%-%e&j%F%#

  %M%C%H%o!<%/$r2p$7$FDL?.$r9T$&0J>e!"%;%-%e%j%F%#$O=EMW$JLdBj$G$"$k!#

- 0[<o%7%9%F%`XNBP1~

  <o!9$N7W;;5!!"%M%C%H%o!<%/$KBP1~G-$k%7%9%F%`$O%*!<%W%sGJ$/$FOJiJ$$!#

- =>Mh%7%9%F%`HN8_49@-

  UNIX JI=>Mh$NOS $H8_49@-$,$"$k!#

3liO!"%M%C%H%o!<%/F)2a@-$"$k$$$OJ,;6F)2a@-$K4X$9$kMW5a$H6%9g9k>19gb"m&$,!"8=<BE*$JMW5aH7$FL5;k$9k3H,G-$J$$!#

2.5 $^$H$a1

$3$3$^$G$K=R$Y$?$h$&$K!"J,;6=hM}$NL\E*$OB?4tKo$?$j!"%7%9%F%`$N1~MQ<!Bh$G$I$l$K=EE@$r$*$/$+!"$I$&$$$C$?5!G=$rOS $H$7$F;Y1g$9$k$+$,7h$^k!#$7$?$,$C$FJ,;6OS $rDj5A$9$kL@3N$J4p=`$,$"ko1GOJ$$!#6/$$F$$&Ji$P!"!%f!<%6$K;q8;$N6&M-!"9b?.Mj2=!"Ii2YJ,;6JIJ,;6=hM}$r8z2IE*$K9T$&5!G=$rDs6!9k*%Z%l!<%F%#%s%0%7%9%F%`!"W$H$$&3HKJm&!#

3 J,;6%7%9%F%`

0J2<GO!"JBNs%"%W%j%1!<%7%g%s$N<B9T$r;X8~7?J,;6%7%9%F%`!"!%f3%s%T%e!<%?!&3%m%K!<!W$r$H$j$"$"$2$k!#$3$l$O!"3F7W;;5!$r9bB.%M%C%H%o!<%/G7k9g$7$?%O!<%I&%'%"$N>e$K!"%=%U%H&%'%"$H$7$F%*%Z%l!<%F%#%s%0%7%9%F%`$rEk:\$7$?!"Am9gE*$J4D6-G"$k!#

3.1 %3%s%T%e!<%?!&3%m%K!<

!%f3%m%K!<!W(colony) HO!"1Q8l$G !"f2BN!W$r0UL#9kC18lG"$k!#!"f2BN!W$H$O@8J*MQ8l$G!"U#?t$N8DBN$,7k9g7F@83h$7!"8_$$K6(D4$7$F$"$?$+$bC10l$N8DBN$Nh&KUk^$&$bNr$$$&!#

$3$3GO!"J#?t$N7W;;5!$, !"f2BN!WN4H/6(D4$7!"C10l$N9b@-G=7W;;5!H7$F07$($k%7%9%F%`$r9=C[9k$?$a$N!"!%f3%s%T%e!<%?!&3%m%K!<!W$r@bL@$9$k!#$=$NGX7J$K$"$k_7WL\I8$O!"<!$Nh&JbNG$"$k!#

- JBNs%"%W%j%1!<%7%g%s$N<B9T
  9bB.$J%M%C%H%o!<%/$dUBNs<B9T$r;X8~$7$?<B9T4D6-$r3+H/$7!":YN3EY$NUBNs<B9T$r<B8=$9$k!#

- 7W;;5!;q8;$NM-8zMxMQ
  %M%C%H%o!<%/>e$GIi2Y$,JPk?aK0lt$N7W;;5!$,$[$HsIMxMQ5l$J$$>uBV$r2sHr$7!"Ii2Y$r%M%C%H%o!<%/A4BN$GJ?6QE*$KJ,;6$5$;$k!#

- 0LCVF)2a@-
  %f!<%6$OMWAG%^%7%s$N0LCV$dIi2Y$N>u67KD$$$F0U<1$9$kI,MWOJ$/!"%7%9%F%`A4BN$KBP7F;E;v$rEjF~$9lP<+F0E*$KIi2Y$rJ,;6$5$;$k!#

- %^%k%A%f!<%64D6-
  J#?t$N%f!<%6$,%7%9%F%`$K=hM}G=NO$NMW5a(QoS:Quality of Service) $r=P$7!"G-$k@$1$=$l$K1~$8$?=hM}G=NO$r%f!<%6$,F@$ilkh&$K!"W;;5!;q8;$rE,@Z$KJ,G[$9$k!#

3.2 %M%C%H%o!<%/9=@.

JBNs%"%W%j%1!<%7%g%s$N8zN($h$$<B9TKO!"9b B.$JDL?.$,IT2D7gG"$k!#$=3G!"J*M}%a%b%j%6u 4VXN%a%b%j%"%/%;%9$GD>@\DL?.$G$-$kh&K9 k?$a9bB.$JDL?.$rDs6!$9$k6&M-%a%b%j%Y!<%9$N %M%C%H%o!<%/HHbK!"$=$N$?$a$N@lMQDL?.%\!< %I$r3+H/9kI,MW$,$"$k!#

%3%s%T%e!<%?!&3%m%K!<$N%O!<%I%&%'%"4D6-$O!" 9bB.%M%C%H%o!<%/$G7k9g$7$?7W;;5!72$G9=@.5l k,!"$=$N9=@.C10LH7F$O!"<!$Nh&JbN, $"$k!#3N7/$_$r?^1$K<($9!#

- %W%m%;%C5

  %W%m%;%C5$O!"%"%/%F%#%S%F%#$K3djEvF$k 7W;;5!;q8;$N:G>.C10LG"$k!#%?%$%`%9i%$ %9Kh$jJ#?t$N%"%/%F%#%S%F%#$KHy>/;~4V$: $D%W%m%;%C5$,3djEvFi1$k!#

- %N!<%I

  %N!<%I$O!"0l$D$NJ*M}%a%b%j$r6&M-9k%W%m %;%C5$N=89g$G$"$k!#%M%C%H%o!<%/>e$N0lBf $NMWAG%^%7%s$,%N!<%IG"$j!"$3NCfKEk:\ 5l$k%W%m%;%C5$OC1?tGbJ#?tGb9=oJ $$!#%N!<%I$OB>$N%N!<%IHNDL?.$r9T$&$?$a!" $=$l$>$l@lMQDL?.%\!<%I$rAuHw$7$F$$k!#$9 YF$N%N!<%I$K%G%#%9%/!"%3%s%=!<%kF~=PNO!" 3OItXNHFMQ%M%C%H%o!<%/$rAuHw$9kI,MWO $J$$!#

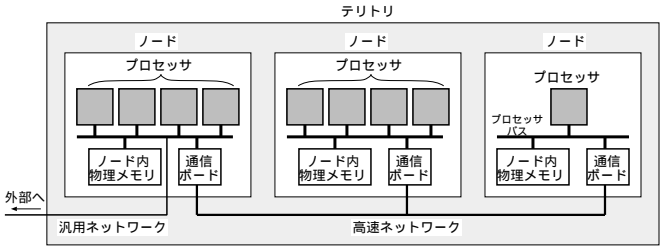
- %F%j%H%j

  %M%C%H%o!<%/$G7k9g$5l?%N!<%I=89g$NA4BN $r%F%j%H%j%H$H$$$&!#%f!<%6$O6B'$H$7F%F%j %H%j$KBP7F;E;v$rEjF~$7!"%N!<%I$d%W%m%;%C %5C10L$NIi2YJ,;6$OColonia $,<+F0E*$K9T$&!#

%3%s%T%e!<%?!&3%m%K!<K*1$kO!<%I%&%'%" 4D6-$O!"C<E*$K8@$($P7W;;5!;q8;$N=89gBNG"$k!# %3%s%T%e!<%?!&3%m%K!<$r9=@.$9$k%N!<%I$K$D$$ $F!"FCDj$N5!<o$d>r7o$O5,Dj7J$/$Fbh$/!"L?Na %;%C%H$N0[Jk%W%m%;%C5$,:.:_$7$?3%s%T%e!<% ?!&3%m%K!<$b9=C[9k3H$,$G$-$k!#

3.3 6&M-%a%b%j$HDL?.%\!<%I

=>Mh$N%M%C%H%o!<%/$OI/O%P%9rDL7F%W%m%;%C %5$K@\B3$5lF$$k$?$a!"%"%/%;%9N?SKI/O



?^1:%3%s%T%e!<%?!&3%m%K!<$N%M%C%H%o!<%/%9=@.

$r07$&%7%9%F%`%3!<%k$rH/9T$7$F%*%Z%l!<%F%#%s %0%7%9%F%`$K@)8f$r0\$9I,MW$,$"$j!"%^%?%M%C%H %o!<%/<+BN$,9bB.Gb!"DcB.$JI/O%P%9$rDL2a$7 J1lPJi$J$$$?a!"I&$7F$bDL?.;~$N%*!< %P%X%C%I$,Bg$-$/Jk!#

3lKBP7%3%s%T%e!<%?!&3%m%K!<$O!"9bB.$J DL?.$r9T$&%O!<%I%&%'%"4D6-H7F!"I/O$d%7%9 %F%`%3!<%k$r;Ho:$K%a%b%j%"%/%;%9%N$_$GDL?. $,$G$-%k%$%s%?%U%'!<%9r%f!<%6$KDs6!$7!"6&M- %a%b%j$r<B8=$9$k!#$3N?a!"@lMQDL?.%\!<%I$r %W%m%;%C%P%9KIU2C$7!"J*M}%a%b%j6u4VKBP9 $k%"%/%;%9rD>@\%M%C%H%o!<%/$K@\B3$9$k!#

3.4 %*%Z%l!<%F%#%s%0%7%9%F%`Colonia $N35MW

9bB.$JDL?.$rDs6!9k!"6&M-%a%b%j%Y!<%9N%M%C %H%o!<%/$H$$$&!"$r:GBg8B$K3hMQ9k KO!"%*%Z%l!<%F%#%s%0%7%9%F%`$K$h$k;Y1g$,,I, MW$G$"$k!#0J2<!"%=%U%H%&%'%"4D6-$H$7F!"%3%s %T%e!<%?!&3%m%K!<$r9=@.$9$kMWAG$H$J$k!"JBNs %"%W%j%1!<%7%g%s$N<B9T$r;X8~$7$?J,;6%*%Z%l!< %F%#%s%0%7%9%F%`!(Colonia!W$,;}$D!"<g$J@_7W>e $NFCD'$r<($9!#

3.4.1 DL?.

Colonia K*1kDL?.$N%W%j_%F%#%V$H$7F$O!" 6&M-%a%b%j$H%7%0%J%k$NFsDrDs6!9k!#DL>o$N %G!<%?DL?.$K$O6&M-%a%b%j$rMQ$$k!#6&M-%a%b%j $rMQ$$k3H$G9bB.$+$D0BA4$JDL?.$,<B8=$G$-!" 0[5!<o4V$G}0l5l$?%s%s%?%U%'!<%9DL?.$, 9T$($k!#$^$?!"%7%0%J%k$OHsF14|%$%Y%s%H$r8zN(h/EAC#9k$?aKMQ$$i1k!#3lirAH$_9g

o;$FMxMQ$9k3HG%a%C%;!<%8DL?.$r<B8=$9k3HbG-$k!#

3.4.2 %_%C%7%g%s!&f%K%C%H%b%G%k

Colonia GO!"0lDN%W%m%0%i%‘$KAjEv$9$k<B9TC10L$H7F!¥_%C%7%g%s!W$rMQ0U$7!"0lDN%_%C%7%g%s$r?k9T$9k?aN:YJ,2=7?JBNs<B9T$NC10L$H7F!¥f%K%C%H!W$rDs6!$9$k!#%f%K%C%H$O$=$l$>$lFHN)7?2>A[%a%b%j6u4V$r;}$D$,!"I,MW$J%3!<%I$d%G!<%?$O%_%C%7%g%sA4BN$G6&M-$7!"A4BN$G6(D4$7$?F0:n$rHk3H$,$G$-$k!#%b$7!"2>A[%a%b%j6u4V$,%"%/%F%#%S%F%#4H$KFHN)$;$:$K9Y$F6&M-$7$F$$k$H!"%"%/%F%#%S%F%#$,JL%N!<%I$KJ,$+lF$$k>19g!"%a%b%j%"%/%;%9$4$H$KDL?.$r9ToMPJiJ$$!#7+$7!"%_%C%7%g%s!&f%K%C%H%b%G%kGOI,MW$JItJ,$@$16&M-$7$FDL?.$r9T$&$,!"%f%K%C%HFbItGN=hM}$ODL?.$r9To:$K9bB.$K<B9TG-$k!#

3.4.3 %^%$%/%m%+!<%M%kJ}<0

%*%Z%l!<%F%#%s%0%7%9%F%‘Colonia $O!¥^%$%/%m%+!<%M%kJ}<0!W$G9=@.$5lk!#3NJ}<0GO!"%7%9%F%‘$N5!G=$NDI2C!&HD%$,!"%7%9%F%‘%5!<%P$rJQ99$9$k$@$1$G9T$($k!#$^$?!"%G%#%9%/$dHFMQ%M%C%H%o!<%/JI$NM-L5$K1~8F%7%9%F%‘%5!<%P$rDI2C$9k3HG%7%9%F%‘9=@.$rJQ99$9k3H,G-$k!#

3.4.4 %F%j%H%j!&9%1%8%e!<%j%s%0

%F%j%H%jA4BN$rBP>]$H7?%9%1%8%e!<%j%s%0$r<B8=$9$k!#%f!<%6$,%F%j%H%jKBP7$FEjF~$7$?;E;v$r!"$=$N;~E@GN3F%N!<%I$NF0E*$JIi2Y>u67$d%N!<%I4V5wN%$+$iH=CG$7$FF0E*$KIi2YJ,;6$9$k!#$^$?!"FCDj$N%N!<%I$K%f%K%C%H$,=8Cf$7$F$$kh&$J>19g$O!"B>$N%N!<%I$K%f%K%C%H$r0\Aw$9$k!#3$NH-!"%f!<%6$,%_%C%7%g%s$4HKMW5a9kQoS rG$-$k$@$1K~B-G-kh$&$JIi2YJ,;6$r9T$&!#Nc$(P!"%j%"%k%?%$%'@-$,MW5a$5lk%^%k%A%a%G%#%"BP1~$N%"%W%j1!<%7%g%s$r<B9T9kH-$O!"%"%W%j1!<%7%g%s$K$*$1$k;~4V$NN.lK=hM}$,DI$$IU/h&$J@-G=$r%7%9%F%‘$ODs6!$9$k!#

3.5 $^$H$a2

8eH>GO!"JBNs%"%W%j%1!<%7%g%s$r;X8~$7$?6&M-%a%b%j%Y!<%9$NJ,;6%7%9%F%‘H7$F%3%s%T%e!<%?!&3%m%K!<$r>R2p$7!"$5iK%3%s%T%e!<%?!&3%m%K!<$r<B8=$9k?aN=%U%H%&%’%"4D6-G"$kJ,;6OS Colonia KD$$F=RY?!#

Colonia $O%3%s%T%e!<%?!&3%m%K!<$N%O!<%I%&%’%"$,Ds6!$9$k9bB.!¤cCY1d$JDL?.$r@Q6KE*$KMxMQ$7!"JBNs%"%W%j%1!<%7%g%s$N8zN(E*$J<B9T$dF0E*Ii2YJ,;6Kh$k7W;;5!;q8;$NM-8zMxMQ!"%^%k%A%f!<%6XNE,@Z$J;q8;$NG[J,$rL\;X$9bNG"$k!#

7+$7!"Colonia $,>e$K=RY?h&$J5!G=$r;}$DOS HJk?aK$O!"$^$@:#8eMM!9$JJ,LnGN8&5f3+H/$,9T$olJ1lPJiJ$$$G$"$m$&!#

4 J,;6%7%9%F% `K*1k9bB.DL?.(5 7n29 F|J,)

J,;6%7%9%F% `$N@_7WL\I8$O!"@h$K=R$Y$?$h$&$K!"

- JBNs%"%W%j%1!<%7%g%s$N<B9T 9bB.$J%M%C%H%o!<%/$dJBNs<B9T$r;X8~7?<B9T 4D6-$r3+H/$7!":YN3EY$NJBNs<B9T$r<B8=9k!#
- 7W;;5!;q8;$NM-8zMxMQ %M%C%H%o!<%/>e$GIi2Y$,JP$k$?$a$K0lIt$N7W ;;5!$,$[Hs$IMxMQ$5lJ$>uBV$r2sHr$7!"Ii 2Y$r%M%C%H%o!<%/A4BN$GJ?6QE*$KJ,;6$5$;$k!#
- 0LCVF)2a@- %f!<%6$OMWAG%^%7%s$N0LCV$dIi2Y$N>u67KD $$F0U<1$9$kI,MWOJ$/!"%7%9%F% `A4BN$KBP 7F;E;v$rEjF~$9lP<+F0E*$KIi2Y$rJ,;6$5 $;$k!#
- %^%k%A%f!<%64D6- J#?t$N%f!<%6$,%7%9%F% `$K=hM}G=NO$NMW5a (QoS:Quality of Service) $r=P$7!"G-k@ 1=lK1~8?=hM}G=NO$r%f!<%6$,F@il$k h&!"7W;;5!;q8;$rE,@Z$KJ,G[9k!#

$H$$$&h&JbN,$"$G$?!#$7$+$7!":#F|$NJ,;6%7%9%F% `$G$O!"%^%7%s4V$NDL?.%l%$%F%s%7$,Hs>o$KBg$-$$$?$a!">e5-$N$h$&$J@_7WL\I8$rK~$?$9$3$H$,$G$-$J$$!#$h$G$F$3$3$G$O!"J,;6%7%9%F% `$r<B8=9k$?$aKI,MWHJGF/$k!"MWAG%^%7%s4V$N9bB.DL?.KD$$$F=RYk!#

5 J,;6%7%9%F% `K*1kDL?.

5.1 8=:_$NJ,;6%7%9%F% `$K$*$1$kDL?.$NCY$5

8=:_$NJ,;6%7%9%F% `$K$*$1$kDL?.$NCY5O!"0J2<$NM}M3$Khk!#

8=:_0lHL$KMxMQ$5lF$$$kJ,;6%7%9%F% `GO!"3F%^%7%s$N%M%C%H%o!<%/$%s%?%U%'!<%9$,DcB.$JI/O %P%9$K@\B3$5lF$$$k!#3N$?$a!"

- I/O %P%9$,%G!<%?E>Aw$N%\%H%k%M%C%/KJ$k!#$=N?$a!"%M%C%H%o!<%/<+BN$N%G!<%?E>AwG=NO$,$Il@$19b$/Fb!"$=$N@-G=$,==J,$KMxMQG-$J$$!#
- ;q8;$NJ]8n$N$?$a!"DL?.;~KOI,$:OS $,2p:_$9k3HKJk!#$=$N$?$a!"%G!<%?%3%T!<$d&3%s%F%-%9%H%9%$%C%A%s%0$N%*!<%P%X%C%I$,@8$8$k!#

$H$$$&Bg$-$JLdBj$,@8$8k3HKJk!#

$^$?!"HFMQ$N%M%C%H%o!<%/$H7FMQ$$$k$?$a$K!"DL?.%W%m%H%3%k$H7F=>Mh$+$i$NTCP/IP $r:NMQ$9$k>l9g$,B?$$!#OS $,2p:_$9k3HKhk%G!<%?%3%T!<$NB>$K!"TCP/IP $r<B8=$5$;$k$?$a$N%G!<%?%3%T!<$bI,MWKJ$j!"$=$N%*!<%P%X%C%I$OL5;kG-$J$$$bNKJC$F$$$k!#

3liNMW0xKh$j!"8=:_$NJ,;6%7%9%F% `GODL?.$N%3%9%H$,Hs>o$K9b$/Jj!"%N!<%I4V$N6(D4F0:n$rBg$-$/AK32$7$F$$$k!#

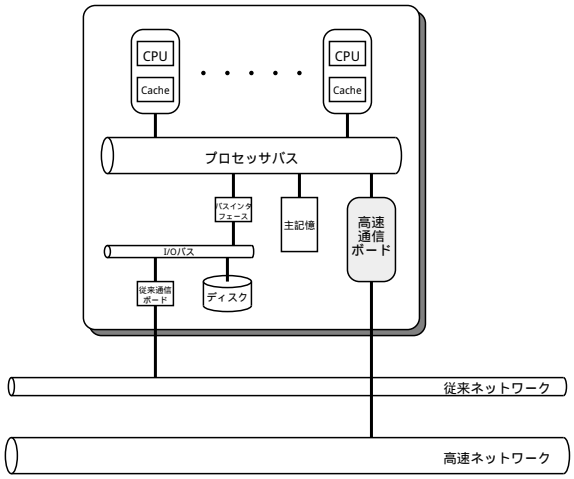
5.2 9bB.!ØcCY1d$JDL?.5!9=

>e5-$NLdBj$r2r7h9k$?$a$K!"%O!<%I&%'"$K;Y1g5l$?6&M-%a%b%j%Y!<%9$NDL?.$r<h$j>e2k!#6&M-%a%b%j$r%Y!<%9$H7?DL?.GO!"MMU(Memory Management Unit, %a%b%j]8n%f%K%C%H) Kh$k%a%b%jJ]8n5!9=$rMxMQ9k3H$G!"DL?.5!9=$r%f!<%6KBP7$F0BA4$K2rJ|9k3H$,$G$-$k!#DL?.;q8;$NJ]8n$OMMU KhCFC#@.5lk?$a!"DL?.5!9=$,0lEY%f!<%6$K3+J|$5lk$H!"8D!9$NDL?.KBP7FOOS $N2p:_$rI,MWH;$:!"9bB.!ØcCY1d$JDL?.$,C#@.$5lk!#

0J2<GO!"3Nh&$J%O!<%I&%'"4D6-$N<B8=NcH7$F!"6&M-%a%b%j%Y!<%9$N%o!<%/%F!<%7%g%s%/%i%9%?$r<($9!#

5.2.1 6&M-%a%b%j%Y!<%9$N%o!<%/%F!<%7%g%s%/%i%9%?$N9=@.

=>Mh$N%^%7%s!Ø%o!<%/%F!<%7%g%s$*$h$S%Q!<%=%J%k%3%s%T%e!<%?!K$K9bB.!ØcCY1d$JDL?.$rDs6!$9$k@lMQ$N%O!<%I&%'"$rIU2C$7!"6&M-%a%b%j%Y!<%9$N%o!<%/%F!<%7%g%s%/%i%9%?$r9=@.$9$k!#6qBNE*$K$O!"%/%i%9%?$r9=@.9k3EMWAG%^%7%s!ØN!<%I!K$N%W%m%;%C5%P%9$KDL?.%\!<%I$r@\B3$9$k!#MWAG%^%7%s$NBg$^$+$J9=@.$r?^2 $K<($9!#



?^2: MWAG%^%7%s$N9=@.

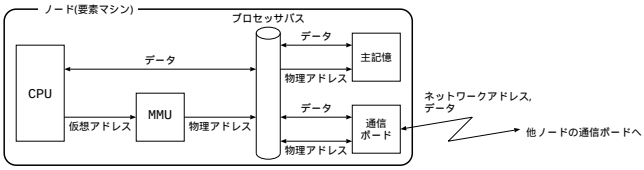
3NDL?.%\!<%I$N4pK\E*$J5!G=$O!"%m!<%+%k%^%7%s$NJ*M}%"%I%l%9$H%j%b!<%H%^%7%s$N<g5-21$rBP1~$E1k3HG"$k!#$9Jo$A!"%a%b%j%"%/%;%9L?NaH/9T;~$K%W%m%;%C%5%P%9$rN.lkJ*M}%"%I%l%9$r=&$$!"I,MW$K1~$8$F%j%b!<%H%a%b%j%"%/%;%9$H$$&7A$NDL?.$r<B8=9kbNG"$k!#

$3$3$G!"%f!<%6%W%m%0%i%`$K$*$1$k%a%b%j%"%/%;%9$O!"2>A[%"%I%l%9$KBP$7$F9T$o$l$k$3$H$KCm0U$9$k!#$=$N$?$a!"%W%m%0%i%`$+$iK\DL?.%\!<%I$rMxMQ7F%j%b!<%H%^%7%sHNDL?.$r9T$&KO!"2>A[%"%I%l%9$+$iJ*M}%"%I%l%9XNBP1~IU1H!"J*M}%"%I%l%9$+$i%j%b!<%H%^%7%s$N<g5-21$X$NBP1~IU$1$r!"$"i+8a@_Dj7F$*$/I,MW$,$"$k!#$7$+$7!"0lEY$=$N%3%M%/%7g%s$r3NN)$7$5$(9lP!"8e$CDL>o$N%a%b%j%"%/%;%9KhCFB>%N!<%I$HDL?.$r9T$&$3H,G-$k!#6qBNE*$K$O!"<!$Nh&$J<j=g$HJk!#

1. %f!<%6$C2>A[%"%I%l%96u4V$K%"%/%;%9$9$k!#
2. MMU $,2>A[%"%I%l%9$rJ*M}%"%I%l%9$KJQ49$7!"%W%m%;%C%5%P%9>e$KN.$9!#
3. DL?.%\!<%I$,J*M}%"%I%l%9$r=&$$!"B>%N!<%IHNDL?.$NI,MW@-$r8!CN9k$H!"<B:]$NDL?.=hM}$r9T$&!#

%G!<%?$*$h$S%"%I%l%9$NN.lr!"?^3 $K<($9!#

8D!9$NDL?.$K$OMMU Kh$k2>A[%"%I%l%9$+$iJ*M}%"%I%l%9XNUQ49$,4^$^$lF*$j!"$3lK$h



?^3: %G!<%?$*$h$S%"%I%l%9$NN.$l

$jDL?.%\!<%I$ODL>o$N<g5-21$HF1$87A$GJ]8n5l$F$$$k!#J]8n$NLdBj$,MMU KhCF2r7h5lk?$a!"DL?.5!9=$r%^%k%A%f!<%6KBP7$F0BA4$K2rJ|9k3H$,$G$-$k!#$=$N7k2L!"%f!<%6$OOS $N2p:_$7$J$$bB.!#DcCY1d$JDL?.$rMxMQ9k3H$,2DG=$KJk!#

9bB.DL?.MQ$NDL?.%W%m%H%3%k$b!"=>MhHN8_49@-$r0U<1$7?TCP/IP %Y!<%9NbNG$"$kI,MWOJ$/!"$^$?=$l$[$I9b5!G=G"kI,MWb$J$$!#J<Ji!"9bB.%M%C%H%o!<%/$O%W%m%H%3%k$rTCP/IP Kh$kDL?.$O!"I/O %P%9$r7PM3$7$?=>Mh%M%C%H%o!<%/e$GDs6!9lPh$$+iG$"$k!#C1=c$JDL?.%W%m%H%3%k$r:NMQ9k3H$G!"DL?.;~$N*!<%P%X%C%I$r5$i$K7Z8:$9k3H,2DG=HJ$k!#

5.2.2 %M%C%H%o!<%/"%I%l%9

6&M-%a%b%j%Y!<%9$N%o!<%/9%F!<%7g%s%/%i%9%?$r<B8=$9k?aNDL?.%\!<%I$O!"%W%m%;%C%5%P%9$rN.lkJ*M}%"%I%l%9$r=&$$!"I,MW$K1~$8$F%j%b!<%H%a%b%j%"%/%;%9$r9T$&$bNG$"$k!#3N%j%b!<%H%a%b%j%"%/%;%9$r<B9T$9$k:]!"DL?.%\!<%I$OAj<j%N!<%I$NDL?.%\!<%I$KBP7F%M%C%H%o!<%/%"%I%l%9$r;H$C$F%/%;%9%9MW5a$rAw$k!#$=7F!"$=$l$r<u1$?DL?.%\!<%I$G!"%M%C%H%o!<%/%"%I%l%9$+$iJ*M}%"%I%l%9$X$NUQ49$r9T$&!#

%M%C%H%o!<%/%"%I%l%9$H$$&Cf4V7A<0$K$$C$?$sJQ49$9$k3H$G!"%N!<%IF`$K*$1$kJ*M}%"%I%l%9$NUQ99$rB>%N!<%I$KBP$7$F1#JC$9$k$3$H$,2DG=$K$J$j!"$=$N7k2L!"%N!<%I$NF`HN)@-$,9b$^$j!"=@Fp$J%7%9%F%`9=C[$,2DG=KJ$k!#

;29MJ88%

[1] A0@n<i,=j?3M}M:,@6?e8,B?O:!Ծ,;6%*%Z%l!<%F%#%s%0!&7%9%F%`!]UNIX $N<!$K$/$kbN,6&N)=PHG(1991).

[2] @DLZ=(5.!ԾBNs%"%W%j%1!<%7%g%s$r;X8~$7$?J,;6%*%Z%l!<%F%#%s%0%7%9%F%`Colonia,FCJL8&5fJs9p=q,5~ETBg3X9)3XIt>pJs9)3X2J(1997).

[3] ;3E:Gn;K!Ծ,;6%*%Z%l!<%F%#%s%0%7%9%F%`Colonia $N6&M-%a%b%j4IM}$H$=$N%(%_%e%l!<%?,FCJL8&5fJs9p=q,5~ETBg3X9)3XIt>pJs9)3X2J(1997).