IK2215 Advanced Internetworking

ISP Project

Group 2

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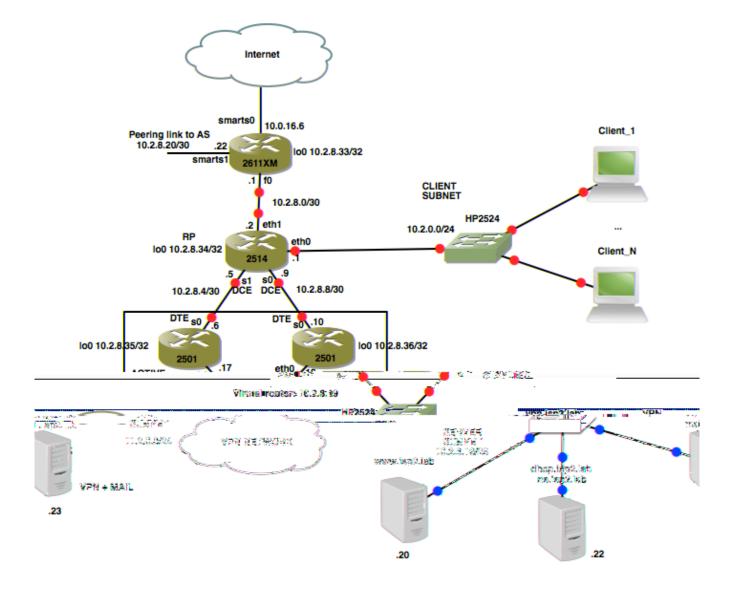# 1   Detail network topology

1.1   Required equipment

We i   e he f   i g e i   e
- Ci c 2611XM
- Ci c 2514
- Ci c 2501 (2)
- HP2524   i ch (2)
- Va i   a   f   i g e ice a d ac i g a h   .

1.2   Network map

D e   he i i a i   i he e i e (i i ed   be f e ia a d e he e   ), he f   i g i   e f he fe   i-
b e i   e e a i   f he   g . R e 2611XM eed   be he e c ec ed   he ISP a d he   he AS beca e
i he   e i h S a Se ia i e face . B h Ci c 2501   e   i ac a a   e i a   e , e f he   he
ac i e a d he he i   a db i g HSRP, hi   a   e ca achie e fa - e a IP   i g i he Se ice e   . R -
e 2514 ac   a a i e edia e   e a d he c ie   e   i c ec ed i . The VPN e   i a h   i he
diag a a d i c ec ed   he VPN e e , he VPN e e i   i g NAT c ec hi e   ISP e   .

1.3   IP address allocation

The f   i g ab e h   he IP a   ca i   i   e   :

Device	Interface	IP address	Host Name
2611XM	smarts0	10.0.16.6	r2611xm.isp2.lab
2611XM	f0	10.2.8.1	-
2611XM	smarts1	10.1.3.22	-
2611XM	lo0	10.2.8.33	-
2514	s0	10.2.8.9	r2514.isp2.lab
2514	s1	10.2.8.5	-
2514	eth0	10.2.0.1	-
2514	eth1	10.2.8.2	-
2514	lo0	10.2.8.34	-
2501 a	s0	10.2.8.6	r2501-a.isp2.lab
2501 a	eth0	10.2.8.17	-
2501 a	lo0	10.2.8.35	-
2501 b	s0		

2 Mandatory tasks

2.1 Routing functionality

2.1.1 Dynamic IP routing

We ha e decided   e OSPF a   i g   c .S e he   ib e d a ic   i g   c   a e RIP, EIGRP a d
IS-IS, EIGRP i a   ie a   c ed Ci c   e i   e . The OSPF   c ha   a ad a age ch a ca abi -
i , a iab e   b e add e i g. The ch ice fe   OSPF beca e OSPF e ab ed e   ed   c e ge a a   ch fa e
   a e ha RIP e   i ca e f fai   e, RIP a   a   15 h (if e eed e a d   ISP i he f   e!) a d
   e e   ce beca e i e d f   da e e   e i d f i e i ead f   e di g da e he   eeded i e OSPF.
F   i e -d ai   i g, e   i be   i g BGP   ad e i e   e   he he ASe .

2.1.2 Fault-tolerant IP routing

A   a ed i   he   g ec i , fa - e a   i g i bei e   ed   he   e c ec i g he   e ice
   e   he   e   f he   (Ci c 2501). The e e   HSRP, a d a ee i he   g a , he i
ac a a i a   e a d if fai e cc (e d , cab e   gged, e c.), he a db   e i a   ac . HSRP i
   ide ed Ci c   e   he e i a f d c e a i , i a   e a a ic   e   bac   hich e f i e -
e i g.
The fai   e ca ea i   be e   ed b   i   ggi g   e f he e ia i   face .

2.1.3 PIM-SM IP Multicast routing

We   i e he RP f   he   ica   i g   be he   e ha c ec   he c ie   e   he e   f he e
(Ci c 2514), e decided d hi beca e he ece e   f he   ica i g i be he c ie   i he e   i ed ce
   he affic a d he   e   .We i e   he RP   c e i h he   bac add e .
M   ica   i be e   ed b   i g   e d a d   ec i h e de   a d ece i e b h i he e e   e   , he c ie   e
   e i   each e   .

2.2 In e ne a   lica ion   e ice

2.2.1 DNS

BIND9 i a e   a a d c   DNS e   e a d   e ha e g   e   be   i h i   e e ie ce i   e i g - BIND.
O e   e i   be   (i   2. ab), a d   e i f   a d e   e ca   e   e he   DNS.
Each de ice   he   i be   e   a ed.
DNS   i be e   ed b   i g dig,   i i a f   a e f   ac ie h .

2.2.2 DHCP

We   i e he i c-dhc - e e ac age   b .
Se e   ed f   e ice   i ge a fi ed IP add e   ba ed   hei MAC add e . O he c ie   i ge a IP f   he
a ai ab e   he DHCP e e .
DHCP i be e   ed b c ec i g a e h   he c ie   i ch a d be i g he IP add e i i a ig ed.

2.2.3 Web server

We   i e he g i eb e e   a b   e   e . The e a e a a ai ab e eb e e ch ice , A ache, gi   , igh d.
The a e   c   di ided i   ce -ba ed a d a d e e -ba ed eb e e . A ache i a e   a   ce ba ed
   e e a d gi i e e ba ed, gi e e a e .
O he ha   hi he i   ch ha diffe be ee   he diffe e   f a e ac age . S e he a ha e diffe e   e a d
c fig a i   e h d , b i he d f   e i   a e ch ha e ch e. Pe f   a ce i   e   e
   be a i e f a eb e e ha   gig   e   e a ic age .
I   he e d e ch e g i beca e e g   e be ie i a d he he d   ca e gh   e .

Web e e f c i a i   i be e ed b ha i g a c ie i he e   acce   .i 2. ab i g he b   e f
hei ch ice.

3   Selective tasks

3.1   Mail Service

Software: Postfix (MTA) + Dovecot (MDA)

P fi i be ed a a MTA   e d a d ecei e e ai be ee   ai e e a d c ie   he I e e , i g SMTP.
D ec a a MDA i be ed i c bi a i   i h P fi   ide e acc   a d ai b e a e a   idi g
ec e acce   h e i g e c ed c ec i (SSL/TLS).
U e i ha e acce   hei ai b   e POP3 a d IMAP. We ee POP3 f c   ai bi i   a e a d f e e h d
eed IMAP f c i a i   ch a ea i g ai   he e e i ead f de e i g he (g ea f acce i g e ai
i e de ice).

We i ha e e i e a agi g i a ai b e (ch a   e 1@i 2. ab   e 2@i 2. ab), hi   e i   ed a a
i e edia e be ee   P fi a d D ec a d i   ha e acce   e ai da a a d hi g e.
F   a he ica i g   e e i e SASL (Si e A he ica i a d Sec i La e) a g i h SHA256 a   d
ha he   ed i a i e e fi e, f e a   e:
  a e @i 2. ab:BPiZbad 6 QKO4 B1ae   VIbd EdUS F d+P =

O e g ea ad a age i ha e ca ee   ac f ai b e a d a   d i g   e fi e i ead f ha i g a c e
M SQL bac e d   e   e a e , e a i e a d a   d , e c.

U e i   ha e SMTP acce if he a e he ISP e   b i g   VPN.
Thi i be i e e ed b dif i g fi / ai .cf a   e e e (e e a).
POP3 a d IMAP i be a ai ab e e e if he e i c ec i g f ide   e .
The DNS e e i f c ec ai a MX ec d i i g he e ai e e .
The e i a he g d i g e ai a a e c i e e ice, a d e i be ab e de   a e he f c i a i b e di g
a d ecei i g e ai a d f   he .A d a   b e di g ai be ee   e   ISP.

3.2   VPN

S f a e: O e VPN
- R ed (TUN) de ice, i g NAT i hi ab e   he VPN e e c ec   ec c ie   b   he I e e
- Ca c ec hi VPN i g ce ifica e i ed b   CA, a d e i ed.
- A he ica i   e c ed i h TLS
- Da a e c ed i h AES-256-CBC (AES i h a 256 bi e a d Ci he B c Chai i g), e ch e hi ci he beca e
256 i he a i a   f bi   ca e f O e VPN igh   .

O e VPN i f ee, e ce a d e ec ed c a ed PPTP f e a   e, a he   a VPN c .
The VPN c ie   b e i be 11.2.0.0/24, e a e a i g ha e ha e a   he a e   be f VPN c ie a
ISP c ie , a /24 f each e .
We c ea ed fi e e e acc he de a i , he e i e f de e acc c ai i g:
- c ie . , he c ie c fig a i fi e ed b Wi d   a d A d id O e VPN c ie f e a   e, f Ub e eed
  e e he c fig a i a a i Ne   Ma age
- a. e , a 2048 bi e ed f TLS a he ica i
- ca.c , CA ce ifica e
- ca. e , he CA i a e
- g 2- e X.c , he c ie ce ifica e...
- g 2- e X. e , ...a d he i a e e .