

LINUX accredited training

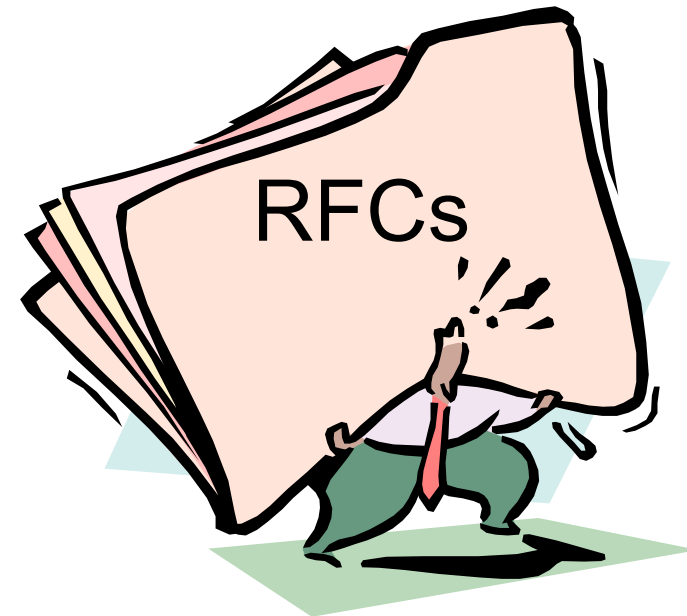
Steve Groombridge
CEO

Systems & Network Training

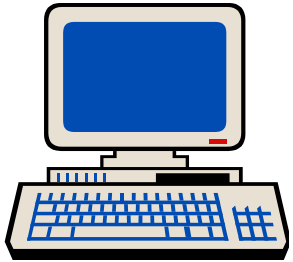
The LINX training programme

Three 5 day courses

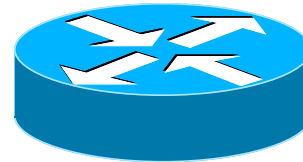
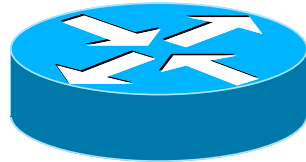
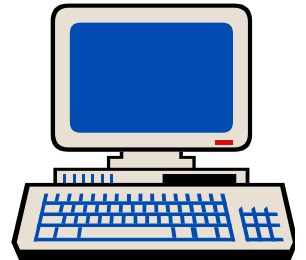
Hands on technology training



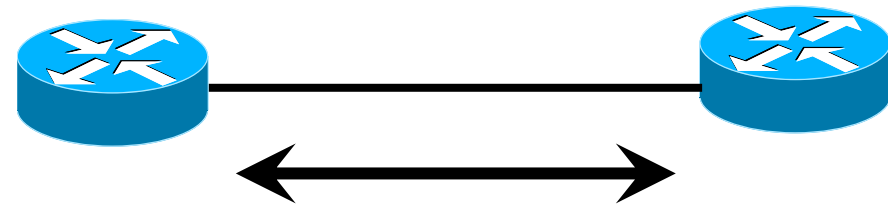
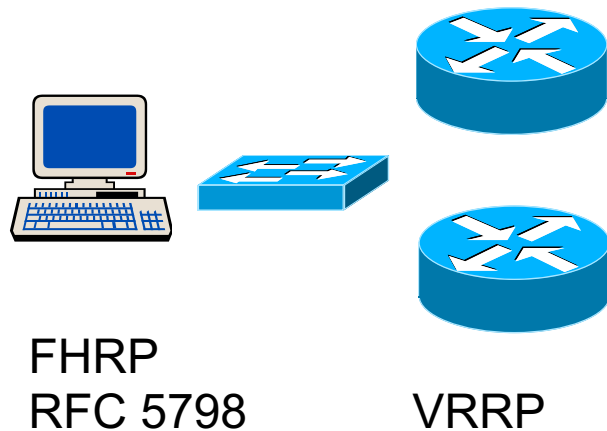
LINUX week 1: TCP/IP



RFC 791
RFC 793
RFC 768
RFC 9226 😊



LINUX week 2: Routing



Routing Protocol

Static routes

RFC 2328

RFC 5340

RFC 7142

OSPFv2

OSPFv3

IS-IS

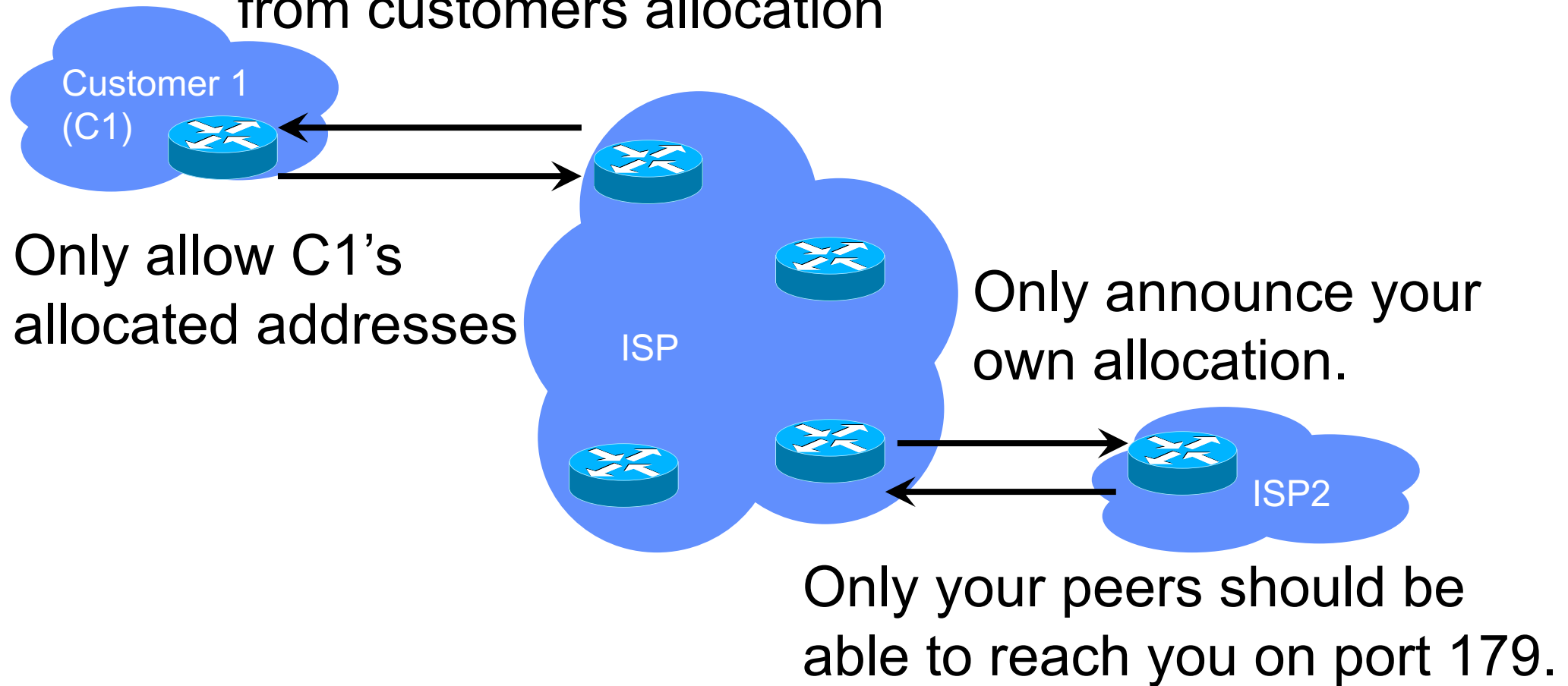
[ISO10589-Second-Edition]

Also simple BGP and MPLS

Learnt by	Destination	Subnet mask	Next hop	Metric	Interface
O	172.16.0.0	255.255.0.0	192.168.1.2	1	g1
O	192.168.3.0	255.255.255.0	192.168.1.2	1	g1
			192.168.2.2	1	g2
D	192.168.1.0	255.255.255.0	Local	0	g1
D	192.168.2.0	255.255.255.0	Local	0	g2

LINUX week 3: BGP

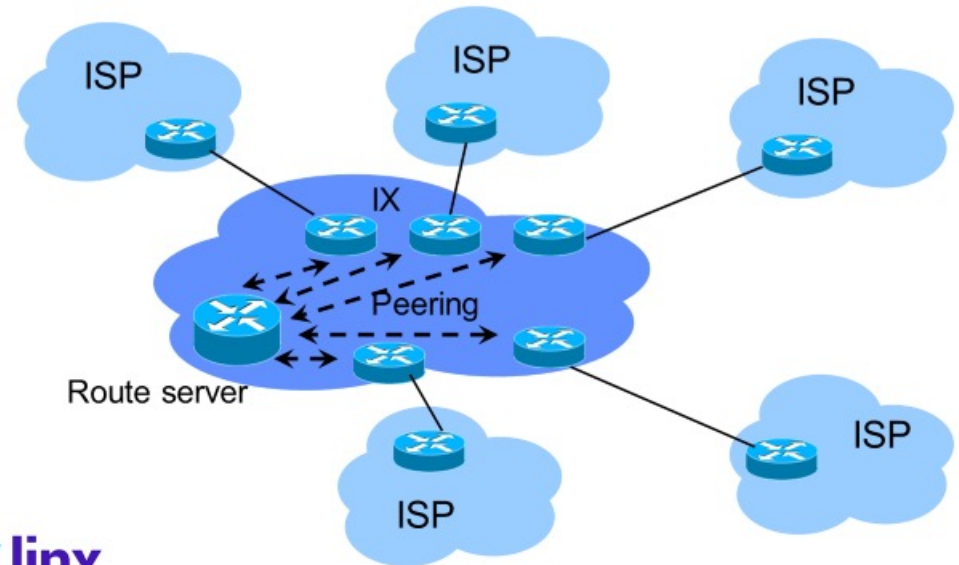
Filter out source addresses
from customers allocation



Other courses: Peering at LINX

- LINX infrastructure
- Connecting with LINX
- Configuration hints
- Peering
- Route servers
- Route collectors
- Tools
- Configuration examples

LINX route servers



LINX training delivery

Face to face



Online live

```

R1#sh ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2
        i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
        ia - IS-IS inter area, * - candidate default, U - per-user static route
        o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

    1.0.0.0/32 is subnetted, 1 subnets
C      1.1.1.1 is directly connected, Loopback0
    2.0.0.0/32 is subnetted, 1 subnets
B      2.2.2.2 [20/0] via 197.1.2.2, 00:01:22
C      197.1.1.0/24 is directly connected, FastEthernet0/0
C      197.1.2.0/24 is directly connected, FastEthernet1/0
R1#sh ip bgp
BGP table version is 3, local router ID is 1.1.1.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network        Next Hop        Metric LocPrf Weight Path
*> 1.1.1.1/32     0.0.0.0          0         32768 i
*> 2.2.2.2/32     197.1.2.2        0         0 65522 i
  
```

Handwritten notes: "next hop" with an arrow pointing to the route for 2.2.2.2/32. "directly connected" with an arrow pointing to the route for 197.1.2.2. "AS Path" written at the bottom right.

Interactive whiteboards

All the hands on
PCs, routers, switches in the cloud

Online exams

Keep your video on as a delegate!

LINUX training: On demand


Ready H2 2022

Still interactive instructor whiteboard


Course objectives

By the end of the course you will be able to:

- ✓ Use ping, traceroute and other tools to diagnose faults on a network.
- ✓ Configure IP on PCs and routers.
- ✓ Plan IP addresses and subnets.
- ✓ Analyse IP and TCP packets using WireShark.
- ✓ Troubleshoot TCP/IP.

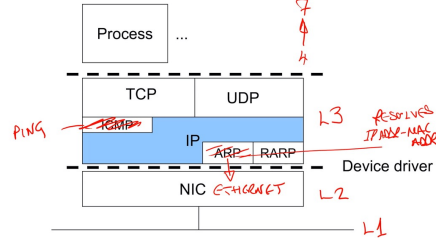


Andy Derrick



We're going to use ping, traceroute and a couple of other tools

IP



ping


L3

L2


L1

resolves IP to MAC addr

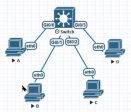
ECHOES



Andy Derrick



Still hands on



A - 172.16.1.1/16
B - 172.16.1.2/16
C - 172.16.1.3/16
D - 172.16.1.4/16

In the left hand pane
- Move windows - select all nodes
- Give the Switch a minute or so to boot up


Right click on the switch and select capture and int G0/2

Ping between A and D. Can you see the PINGs?


Can you PING the switch? What's it missing?

Can you see any packets that were sent from A to D?

If so look at the Destination MAC Address of the Frame and take note for later!



Andy Derrick



So the PCs are switched on

IMPORTANT:

Please contact the SNT office if you experience any issues logging in and accessing remote desktop and the labs

Email:
support@snt.co.uk

Responses will be during UK office hours
9am - 5.30pm

And real delegate questions!

Netmask change:

<https://www.linx.net/linx-lon1-netmask-change/>

To enable the ongoing growth of the LINX LON1 peering LAN, the assigned IPv4 network will be changing from 195.66.224.0/22 to 195.66.224.0/21.

Ranges

Mask	Prefix	Addresses in range
255.255.255.0	/24	256

If the first 24 bits are the same we are in the same range.

If the first 24 bits are different we are in a different range.

E.g.: 10.1.1.0/24

All the time the first 24 bits are the same
we're in the same network/range



/21	2048
/22	1024
/23	512
/24	256
/25	128

Netmask change:

<https://www.linx.net/linx-lon1-netmask-change/>

To enable the ongoing growth of the LINX LON1 peering LAN, the assigned IPv4 network will be changing from 195.66.224.0/22 to 195.66.224.0/21.

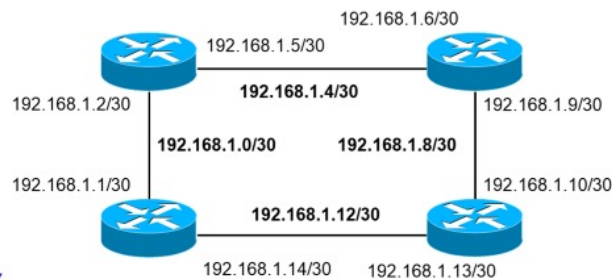
Chunks

Mask	Prefix	Addresses in range
255.255.255.252	/30	4

/17	/18	/19	/20	/21	/22	/23	/24
128	64	32	16	8	4	2	1

Binary: If the first 30 bits are the same we are in the same range.

Chunks: Just count in 4s (in this case)



Was (/22) Jumps of 4

195.66.224.0 to one below
192.66.228.0

Now (/21) Jumps of 8

195.66.224.0 to one below
192.66.232.0

Static configuration of IPv6 Link local addresses

After the end of May, the LINX NOC will contact any LINX members who are still using non-assigned IPv6 link-local addresses. Continued use of non-assigned IPv6 link-local addresses after mid-June might result in your peering sessions going down, so it is very important that you confirm and correct your current configuration by then.

Address allocation

IPv6 Prefix	Allocation	Reference
-----	-----	-----
0000::/8	Reserved by IETF	[RFC4291]
0100::/8	Reserved by IETF	[RFC4291]
0200::/7	Reserved by IETF	[RFC4048]
0400::/6	Reserved by IETF	[RFC4291]
0800::/5	Reserved by IETF	[RFC4291]
1000::/4	Reserved by IETF	[RFC4291]
2000::/3	Global Unicast	[RFC4291]
4000::/3	Reserved by IETF	[RFC4291]
6000::/3	Reserved by IETF	[RFC4291]
8000::/3	Reserved by IETF	[RFC4291]
A000::/3	Reserved by IETF	[RFC4291]
C000::/3	Reserved by IETF	[RFC4291]
E000::/4	Reserved by IETF	[RFC4291]
F000::/5	Reserved by IETF	[RFC4291]
F800::/6	Reserved by IETF	[RFC4291]
FC00::/7	Unique Local Unicast	[RFC4193]
FE00::/9	Reserved by IETF	[RFC4291]
FE80::/10	Link-Scoped Unicast	[RFC4291]
FEC0::/10	Reserved by IETF	[RFC3879]
FF00::/8	Multicast	[RFC4291]

RFC 4291

All interfaces are required to have at least one Link-Local unicast address



Static configuration of IPv6

Link local addresses (2)

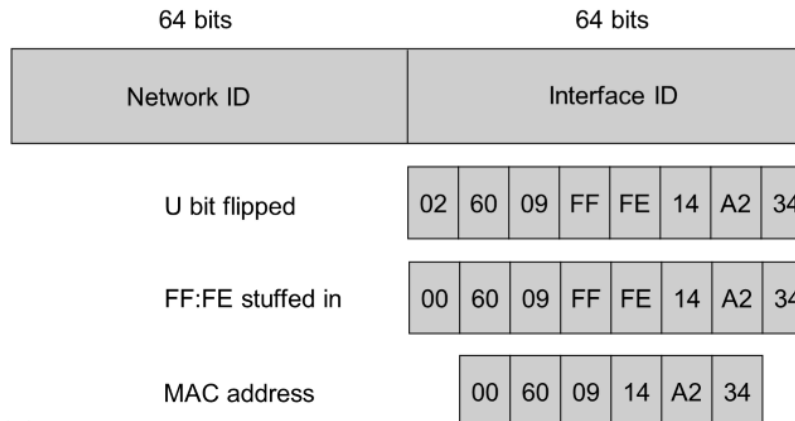
...ensure the assigned IPv6 link-local addresses are configured on their peering LAN ports:

1. Confirm the assigned IPv6 link-local addresses on the LINX member portal (bottom of <https://portal.linx.net/my-services/port-based>)

This is the port's MAC address converted into an **EUI-64 IPv6 link-local address**, most member ports are already using this address as many NOS implementations auto-assign it by default.

2. **Statically configure** the assigned IPv6 link-local addresses and unconfigure any other IPv6 link-local addresses on your LINX peering LAN ports

Extended Unique Identifier – 64 addresses



← FE80::0260:09FF:FE14:A234

Exam: Netmask change

Select the best 3 answers with regard to the recent LON1 (195.66.224.0) netmask change:

- A. New IPv4 addresses are needed for the new mask
- B. The current IPv4 addresses can be kept
- C. 195.66.232.207 should be pingable after the change (from your local router)
- D. 195.66.231.207 should be pingable after the change (from your local router)
- E. The /22 allowed for 512 addresses
- F. The /21 allows for 2048 addresses

Exam: IPv6 Link-local on LON1

Select the best 5 answers with regard to *LINUX MoU Appendix 1, Section 3.1*:

- A. IPv6 link local addresses should use RFC 9226 format
- B. IPv6 link local addresses should follow RFC 4291 rules
- C. IPv6 link local addresses are defined by FE80::/10
- D. IPv6 link local addresses are defined by FE80::/8
- E. The link local address may be pinged from a remote network
- F. The link local address may be pinged from the directly connected network
- G. LINUX recommend to use the default IPv6 link local address on LON01
- H. LINUX recommend to statically configure the IPv6 link local address on LON01
- I. LINUX recommend to use a randomly generated IPv6 link local address on LON01
- J. LINUX recommend using EUI 64 format link local address on LON01

Summary

Thank you!

They are your courses:

Suggestions to:

Steve Groombridge
(01737) 821590
steve@snt.co.uk