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The workshop materials are based on the content of the extremely successful Cisco ISP/IXP Workshop programme which ran from 1997 until 2011, built by a cast of dozens of contributors from technical experts inside Cisco to highly experienced network engineers and operators across the Internet community. While the programme is sadly no longer active within Cisco, many industry friends and volunteers still use and develop the materials for use in workshops taking place in the Network Operations Group fora and other gatherings around the world.

If you like the materials, and want to make derivative works, Philip is happy for you to do that. Please acknowledge Philip, Cisco, and the Network Startup Resource Center, without whom this collection of training materials would simply not be available. Rebranding these materials with your logos and claiming they are yours is simply not okay.

Most of the presentations below have been recorded during 2017 and 2019. If you'd like to see the presentations given live, then please look at NSRC's Video Collection for this content (and on many other topics as well).

If you have any suggestions for improvements, or any contributions you'd like to make to the materials, these would be most welcome, with full acknowledgements, of course.

## **Presentations**

Category	Presentation	Notes	
	Routing Introduction	How routing works	
	OSPF Introduction	25 slide primer on OSPF	
	OSPF for ISPs	A lot more detail about OSPF	
	IS-IS Introduction	25 slide primer on IS-IS	
	IS-IS for ISPs	A lot more detail about IS-IS	
	Comparing IS-IS with OSPF	Valuable comparison between the two protocols	
	Migration from OSPF to IS-IS	The simple steps to move from one to the other	

Presentation	Notes
BGP Introduction	Introductory slideset
Scaling BGP	How to scale BGP for today's networks
32bit AS Numbers	What they are and how to deploy
BGP Attributes	Describing all the BGP attributes
BGP Policy	How to use attributes to implement policy
BGP Best Current Practices	Industry best current practices
Transitioning to BGP	How to move from static routed network to using BGP
Multihoming: Introduction	The whys and wherefores of multihoming
Multihoming: Inbound TE	Inbound Traffic Engineering Examples
Multihoming: Outbound TE	Outbound Traffic Engineering
Multihoming: Deployment	Deploying Multihoming for End-Sites
BGP Communities	More advanced BGP policy and traffic engineering
BGP Case Studies	Some multihoming case studies
Troubleshooting BGP	BGP Troubleshooting (old NOG tutorial)
Internet Introduction	Introductory slideset
Internet Evolution	The Internet from the 90s until today
The Value of Peering	Why peering is fundamentally important for the Internet
IXP Design	The why and how of design and building an IXP
LINX History	The history of LINX from 1994 to 1997: my experience
ISP Network Design	The key components for designing a service provider backbone network
Transit and Peering Network Design	The key components for planning upstream transit and peering connectivity
Peering Deployment	How to go about Peering (Private & at IXPs) in detail
ISP Systems Design	
Choosing Routers	How to choose a router
	Scaling BGP 32bit AS Numbers BGP Attributes BGP Policy BGP Best Current Practices Transitioning to BGP Multihoming: Introduction Multihoming: Inbound TE Multihoming: Outbound TE Multihoming: Deployment BGP Communities BGP Case Studies Troubleshooting BGP Internet Introduction Internet Evolution The Value of Peering IXP Design LINX History ISP Network Design Peering Deployment ISP Systems Design

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Category	Presentation	Notes	
	IPv6 Introduction	Why we need to deploy IPv6	
	The IPv6 Protocol	All about the protocol and IPv6 standards	
	IPv6 Address Planning	How to do IPv6 addressing in a network	
	IPv6 Address Planning Exercise	Putting presentation into practice	
	IPv6 Routing	Introduction to IPv6 specific features in the common routing protocols	
	Introduction to OSPFv3	OSPF for IPv6	
IPv6	ISIS for IPv6	IPv6 support in IS-IS	
	BGP for IPv6	IPv6 support in BGP	
	IPv6 Transition Planning	A review of relevant transition mechanisms for today's Internet	
	Securing IPv6 Transition Mechanisms	And how to secure these mechanisms	
	IPv6 Deployment Study	The simple steps to deploying IPv6 on a network operator's backbone - technical version	
	IPv6 Deployment Planning	The simple steps to deploying IPv6 on a network operator's backbone - high level version	
	IPv6 Security	And introduction to security for IPv6	
	IPv6 Device Hardening	Device hardening, with a focus on IPv6	
	IPv6 Routing Security	Implementing routing security, specifically related to IPv6	
Security	Remotely Triggered Blackhole Filtering	Describing how RTBH filtering works	
	BGP Origin Validation	RPKI and securing BGP announcements	
	Unicast Reverse Path Forwarding	Implementing uRPF for BCP38	

## Labs

Category	Lab Modules	Notes
IPv4	Workshop Setup	
	Introducing IS-IS or Introducing OSPF	
	Introducing iBGP	
	OSPF Areas	
	BGP Route Reflector	
	Cisco IOS Essentials	
	Policy Routing	
	IS-IS, iBGP & eBGP or OSPF, iBGP & eBGP	
	IS-IS, iBGP & eBGP from scratch	For IXP Workshop
	BGP Route Filtering	
	BGP Policy	
	BGP Best Practices	
	Simple IXP	
	Advanced IS-IS & iBGP or Advanced OSPF & iBGP	
	Multi-AS (IS-IS) & Advanced IXP or Multi-AS (OSPF) & Advanced IXP	
	Address Plan for single AS lab	
	Address Plan for 4 AS lab	

Category	Lab Modules	Notes
	Workshop Setup	
	Introducing IS-IS or Introducing OSPFv3	
	Introducing iBGP	
	OSPF Areas	
	BGP Route Reflectors	
	Migrating from OSPF to IS-IS	
	Migrating Dual Stack OSPF to IS-IS	
	IS-IS, iBGP & eBGP or OSPFv3, iBGP & eBGP	
IPv6	IS-IS, iBGP & eBGP from scratch	for IXP Workshop
	BGP Route Filtering	
	BGP Policy	
	IPv6 Access	
	Simple IXP	
	Advanced IS-IS & iBGP or Advanced OSPFv3 & iBGP	
	Multi-AS (IS-IS) & Advanced IXP or Multi-AS (OSPF) & Advanced IXP	
	Address Plan for single AS Labs	
	Address Plan for 4 AS Labs	

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Last update: 2021/12/01 05:22

