



**DEPARTMENT OF INFRASTRUCTURE AND ENERGY**

***Technical Aspects of Setting up, Operating and Administering Internet Exchange Points (IXPs)***

**DAY 1 “IP Resources and Routing Basics”**

**08:00 – 08:30**

**Registration**

**08:30 – 10:30**

***Introduction to Internet Protocol (IP) and Number Resources***

*Facilitator:*

- Introduction to IPv4 and IPv6
- Internet Number Resources

**10:30 – 11:00**

**Coffee Break**

**11:00 – 13:00**

***Introduction to Routing***

*Facilitator:*

- Routing Basics

**13:00 – 14:00**

**Networking & Lunch**

**14:00 – 16:00**

***Introduction to Internal Gateway Protocols (IGPs)***

*Facilitator:*

- Introduction to OSPF v2
- OSPF Deployment for ISPs

**16:00 – 16:30**

**Coffee break**

**16:30 – 18:00**

- OSPF Lab Exercises
  - Basic OSPF (Module 01a. IPv4 + OSPFv2)

*Facilitator:*

**DAY 2 “Introduction to BGP”**

**08:00 – 08:30**

**08:30 – 10:30**

***Introduction to Exterior Gateway Protocol (EGPs)***

*Facilitator:*

- Introduction to BGP

**10:30 – 11:00**

**Coffee Break**

	<b><i>BGP Hands-on Lab Exercise</i></b>	<i>Facilitator:</i>
11:00 – 13:00	<ul style="list-style-type: none"> <li>iBGP Lab Exercise (Module 1c. IPv4+OSPFv2 + iBGP)</li> </ul>	
<b>13:00 – 14:00</b>	<b>Networking &amp; Lunch</b>	
14:00 – 16:00	<b><i>BGP Attributes and Scaling Techniques</i></b>	<i>Facilitator:</i>
	<ul style="list-style-type: none"> <li>BGP Scaling Techniques</li> <li>BGP Attributes</li> </ul>	
<b>16:00 – 16:30</b>	<b>Coffee break</b>	
	<b><i>BGP Hands-on Lab Exercise</i></b>	<i>Facilitator:</i>
16:30 – 18:00	<ul style="list-style-type: none"> <li>eBGP Lab Exercise (Module 6a. IPv4+OSPFv2 + iBGP + eBGP)</li> </ul>	

### **DAY 3 “BGP Policy Control and Multihoming”**

<b>08:00 – 08:30</b>	<b><i>Registration</i></b>	
08:30 – 10:30	<b><i>BGP Policy and Best Practices</i></b>	<i>Facilitator:</i>
	<ul style="list-style-type: none"> <li>Implementing BGP Policy Controls</li> <li>BGP Best Practices for ISPs</li> </ul>	
<b>10:30 – 11:00</b>	<b>Coffee Break</b>	
	<b><i>BGP Policy Control Hands-on Lab Exercise</i></b>	<i>Facilitator:</i>
11:00 – 13:00	<ul style="list-style-type: none"> <li>BGP Filtering Exercise (Module 7 IPv4 +OSPF+ iBGP + eBGP + Prefix-Lists and ASN Path)</li> </ul>	
<b>13:00 – 14:00</b>	<b>Networking &amp; Lunch</b>	
14:00 – 16:00	<ul style="list-style-type: none"> <li>BGP Filtering Exercise</li> <li>(Module 7 IPv4 +OSPF+ iBGP + eBGP + BGP Communities)</li> </ul>	<i>Facilitator:</i>
<b>16:00 – 16:30</b>	<b>Coffee break</b>	
	<b><i>Introduction to Multi-homing</i></b>	
16:30 – 18:00	<ul style="list-style-type: none"> <li>Simple Multi-homing</li> <li>Advanced Multi-homing Techniques</li> </ul>	<i>Facilitator:</i>

**DAY 4 "Introduction to Internet Exchange Points"**

08:00 – 08:30

**Registration**

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08:30 – 10:30

- Multi-homing Hands-on Lab Exercise *Facilitator:*
  - BGP Local Preference Exercise  
(Module 8. IPv4 + OSPF+iBGP+eBGP+PrefixList+LocalPref)
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10:30 – 11:00

**Coffee Break**

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11:00 – 13:00

- Multi-homing Hands-on Lab Exercise *Facilitator:*
- BGP Local Preference Exercise  
(Module 8. IPv4 + OSPF+iBGP+eBGP+PrefixList+AS Path-Prepend)

**Scalable Network Design**

- ISP Network Design
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13:00 – 14:00

**Networking & Lunch**

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14:00 – 16:00

**Introduction to Internet Exchange Points (IXPs)** *Facilitator:*

- Value of Peering
  - IXP Network Design
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16:00 – 16:30

**Coffee break**

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16:30 – 18:00

**IXP Hands-on Lab Exercise**

- Advanced IXP Lab Exercise *Facilitator:*  
(Module 16a OSPF+iBGP+eBGP+IXP+Transit)
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**DAY 5 “IXP and Traffic Monitoring”**

**08:00 – 08:30**

**Registration**

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08:30 – 10:30

**IXP Hands-on Lab Exercise**

*Facilitator:*

- Advanced IXP Lab Exercise  
(Module 16a  
OSPF+iBGP+eBGP+IXP+Transit)
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**10:30 – 11:00**

**Coffee Break**

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**IXP Hands-on Lab Exercise**

*Facilitator:*

11:00 – 13:00

- Advanced IXP Lab Exercise  
(Module 16a  
OSPF+iBGP+eBGP+IXP+Transit)
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**13:00 – 14:00**

**Networking & Lunch**

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14:00 – 16:00

**Network Monitoring & Value Added Services**

*Facilitator:*

- Traffic Monitoring and Flow Analysis
  - Selecting an IXP
  - PeeringDB and Role of Peering Coordinator
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**16:00 – 16:30**

**Coffee break**

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16:30 – 18:00

**Way Forward and Certificate Ceremony**

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