

# Tutorial: BGP Multihoming with IPv4 and IPv6

Philip Smith

**Abstract:** This tutorial introduces service providers to some of the features available in BGP to aid multihoming to the Internet. After an explanation of multihoming and the principles being followed in this tutorial, several examples involving different scenarios will be given. This includes the options available when multihoming to the same ISP (including RFC2270) and to different upstreams. Configurations for modifying inbound and outbound traffic flows are covered. The tutorial concludes with a case study, and an examination of the use of BGP communities by several ISPs.

## Abstracts

- Network Management and NOC Workshop  
Hervey Allen (NSRC), Phil Regnaud (NSRC), Chris Evans (Delta-Risk)
- VOIP Deployment Workshop  
Jonny Martin (PCH), Vicky Shrestha (PCH), Daniel Griggs (FX Networks)
- Network Security Workshop  
Damien Holloway (Juniper Networks), Kunjal Trivedi (Cisco), Merike Kaeo (DoubleShot Security)
- ISP Routing Workshop using IPv4 and IPv6  
Gaurab Raj Upadhaya (PCH), Amante Alvaran (APNIC), Shankar Vridhagiri
- Advanced Routing - BGP Multihoming with IPv4 and IPv6  
Philip Smith (Cisco), Mark Tinka (Global Transit)
- Toward The Internet 2.0  
Hiroshi Esaki, Ph.D.
- Advancing the Philippines' Internet Infrastructure  
William Torres, Ph.D.
- Integrating IP Wireless Sensor Networks  
Patrick Grossetete, Archrock
- Lessons Learnt from the Beijing Olympic Games Website Measurement  
Rocky K. C. Chang, The Hongkong Polytechnic University
- A technical demo and overview of .tel  
Jim Reid (Telnic)
- BGP IN 2008 - what's changed  
Geoff Huston (APNIC)
- IPv6 Traffic levels on Hurricane Electric's backbone  
Martin Levy (Hurricane Electric)
- JANET's 40Gbps backbone  
Rob Evans (JANET)
- From IPv4 only to v4/v6 Dual Stack  
Shin Miyakawa (NTT)
- How to Keep CGNs from Breaking the Internet  
Randy Bush (IJJ)
- IPv6 Deployment at IJJ  
Yoshinobu Matsuzaki (IJJ)
- Session aware NAT  
David Miles (Alcatel-Lucent)
- IANA and DNSSEC at the root  
Richard Lamb (IANA)

- IPv6 at Google: lessons learned, state of the art, and the road to deployment  
Lorenzo Colitti(Google)
- Euro-IX update  
Serge Radovic (Euro-IX)
- IPv6 at Monash University  
John Mann(Monash University)
- What can IXPs do for IPv4/IPv6 route exchange?  
Takabayashi Takejiro (Japan Internet Exchange Co., Ltd.) and Mawatari Masataka (Co-author)
- What can IXPs do about IPv4 exhaustion?  
MAWATARI Masataka (Japan Internet Exchange Co., Ltd.) and TAKABAYASHI Takejiro
- DNS-OARC's Open DNSSEC Validating Resolver  
Duane Wessels(DNS-OARC)
- AMS-IX Update  
Cara Mascini(AMS-IX)
- DNSSEC in 6 minutes  
Joao Damas (ISC)
- NIXI - Internet Exchanges in India  
Amitabh Singhal,NIXI
- IPv6 - IPv4 Co-Existence: IETF Report  
Jari Arkko, Ericsson Research, IETF
- Rogue DNS servers - a case study  
Feike Hacquebord,Trend Micro
- Building a very large scale compute system for organizing the worlds information and making it universally accessible  
Vijay Gill
- Mobile Backhaul Architecture Options  
Rishi Mehta ,Redback Networks
- Membership Development  
Tomas Marsalek, NIX.CZ
- Broadband Forum v6 Home Networks  
David Miles, Alcatel-Lucent
- BGP Routing Scalability Considerations  
Danny McPherson,Arbor Networks, Inc. Co-author: Shane Amante, Lixia Zhang
- 2008 Infrastructure Security Report  
Danny McPherson,Arbor Networks, Inc.
- 32-bit ASNs  
Chris Malayter, Switch&Data, Co-author: Greg Hankins , Force10 Networks
- The Internet Regulatory Environment in Saudi Arabia  
Dr. Ibraheem S. Al-Furaih (CITC)
- Tutorial: Introduction to IPv6  
Kurtis Lindqvist (NetNod)
- Tutorial: BGP Multihoming Techniques  
Philip Smith (Cisco)
- Tutorial: BGP Techniques for Service Providers  
Philip Smith (Cisco)
- Tutorial: Troubleshooting BGP  
Philip Smith (Cisco)
- Tutorial: Network Core Infrastructure - Best Practices  
Yusuf Bhaiji (Cisco)
- Tutorial: Anatomy of a network attack, network forensics, network attack and defense  
APNIC Training Team and Team Cymru

- Tutorial: Internet Routing Registry  
APNIC Training Team
- Tutorial: MPLS Service, Applications & Deployment Best Practices  
Santanu Dasgupta (Cisco Systems) and Kasu Venkat Reddy
- Tutorial: Layer 2 Attacks and Mitigation Techniques  
Yusuf Bhaiji (Cisco)
- Tutorial: Managing Voice Quality in Converged IP Networks  
Faisal Chaudhry (Cisco Systems)
- Tutorial: Internet Resource Management Essentials (IRME)  
APNIC Training Team
- Tutorial: DNSSEC Deployment  
Phil Regnauld and Hervey Allen (Network Startup Resource Center)
- Tutorial: MPLS-based Metro Ethernet Services  
Paresh Khatri (Alcatel-Lucent)
- Tutorial: IPv6 Deployment  
Mark Tinka (Global Transit International)
- Tutorial: IS-IS Deployment (Dual-Stack)  
Mark Tinka (Global Transit International)