



Internet e architetture di rete

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Ciclo di seminari - Calendario

Internet: Sistemi autonomi e Governance

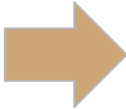
08 Novembre 2017

Addio IPv4

22 novembre 2017

Benvenuto IPv6

29 novembre 2017

 **Architetture di instradamento a Internet: BGP**

06 dicembre 2017

Numeri e Nomi: DNS

13 dicembre 2017

35 anni di e-mail: SMTP

To be defined





Architetture di instradamento a Internet: BGP



RFC 1105	ASCII, PDF	Border Gateway Protocol (BGP)	K. Lougheed, Y. Rekhter	June 1989	Obsoleted by RFC 1163	Experimental
RFC 1163	ASCII, PDF	Border Gateway Protocol (BGP)	K. Lougheed, Y. Rekhter	June 1990	Obsoletes RFC 1105 , Obsoleted by RFC 1267	Historic
RFC 1164	ASCII, PDF	Application of the Border Gateway Protocol in the Internet	J.C. Honig, D. Katz, M. Mathis, Y. Rekhter, J.Y. Yu	June 1990	Obsoleted by RFC 1268	Historic
RFC 1265	ASCII, PDF	BGP Protocol Analysis	Y. Rekhter	October 1991		Informational
RFC 1266	ASCII, PDF	Experience with the BGP Protocol	Y. Rekhter	October 1991		Informational
RFC 1267	ASCII, PDF	Border Gateway Protocol 3 (BGP-3)	K. Lougheed, Y. Rekhter	October 1991	Obsoletes RFC 1163	Historic
RFC 1268	ASCII, PDF	Application of the Border Gateway Protocol in the Internet	Y. Rekhter, P. Gross	October 1991	Obsoletes RFC 1164 , Obsoleted by RFC 1655	Historic
RFC 1269	ASCII, PDF	Definitions of Managed Objects for the Border Gateway Protocol: Version 3	S. Willis, J.W. Burruss	October 1991	Obsoleted by RFC 4273	Proposed Standard
RFC 1364	ASCII, PDF	BGP OSPF Interaction	K. Varadhan	September 1992	Obsoleted by RFC 1403	Proposed Standard
RFC 1397	ASCII, PDF	Default Route Advertisement In BGP2 and BGP3 Version of The Border Gateway Protocol	D. Haskin	January 1993		Historic (changed from Proposed Standard March 2006)
RFC 1403	ASCII, PDF	BGP OSPF Interaction	K. Varadhan	January 1993	Obsoletes RFC 1364	Historic (changed from Proposed Standard August 2001)

1989

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1993



RFC 1654	ASCII, PDF	A Border Gateway Protocol 4 (BGP-4)	Y. Rekhter, Ed., T. Li, Ed.	July 1994	Obsoleted by RFC 1771	Proposed Standard
RFC 1655	ASCII, PDF	Application of the Border Gateway Protocol in the Internet	Y. Rekhter, Ed., P. Gross, Ed.	July 1994	Obsoletes RFC 1268 , Obsoleted by RFC 1772	Proposed Standard
RFC 1656	ASCII, PDF	BGP-4 Protocol Document Roadmap and Implementation Experience	P. Traina	July 1994	Obsoleted by RFC 1773	Informational
RFC 1657	ASCII, PDF	Definitions of Managed Objects for the Fourth Version of the Border Gateway Protocol (BGP-4) using SMIPv2	S. Willis, J. Burruss, J. Chu, Ed.	July 1994	Obsoleted by RFC 4273	Draft Standard
RFC 1745	ASCII, PDF	BGP4/IDRP for IP---OSPF Interaction	K. Varadhan, S. Hares, Y. Rekhter	December 1994		Historic (changed from Proposed Standard)
RFC 1771	ASCII, PDF	A Border Gateway Protocol 4 (BGP-4)	Y. Rekhter, T. Li	March 1995	Obsoletes RFC 1654 , Obsoleted by RFC 4271 , Errata	Draft Standard
RFC 1772	ASCII, PDF	Application of the Border Gateway Protocol in the Internet	Y. Rekhter, P. Gross	March 1995	Obsoletes RFC 1655	Draft Standard
RFC 1773	ASCII, PDF	Experience with the BGP-4 protocol	P. Traina	March 1995	Obsoletes RFC 1656	Informational
RFC 1774	ASCII, PDF	BGP-4 Protocol Analysis	P. Traina, Ed.	March 1995	Errata	Informational
RFC 1863	ASCII, PDF	A BGP/IDRP Route Server alternative to a full mesh routing	D. Haskin	October 1995	Obsoleted by RFC 4223	Historic (changed from Experimental)

1994

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1995



RFC 1930 part of BCP 6	ASCII , PDF	Guidelines for creation, selection, and registration of an Autonomous System (AS)	J. Hawkinson, T. Bates	March 1996	Updated by RFC 6996 , RFC 7300	Best Current Practice
RFC 1965	ASCII , PDF	Autonomous System Confederations for BGP	P. Traina	June 1996	Obsoleted by RFC 3065	Experimental
RFC 1966	ASCII , PDF	BGP Route Reflection An alternative to full mesh IBGP	T. Bates, R. Chandra	June 1996	Obsoleted by RFC 4456 , Updated by RFC 2796	Experimental
RFC 1997	ASCII , PDF	BGP Communities Attribute	R. Chandra, P. Traina, T. Li	August 1996	Updated by RFC 7606 , Errata	Proposed Standard
RFC 1998	ASCII , PDF	An Application of the BGP Community Attribute in Multi-home Routing	E. Chen, T. Bates	August 1996		Informational
RFC 2042	ASCII , PDF	Registering New BGP Attribute Types	B. Manning	January 1997	Errata	Informational
RFC 2270	ASCII , PDF	Using a Dedicated AS for Sites Homed to a Single Provider	J. Stewart, T. Bates, R. Chandra, E. Chen	January 1998		Informational
RFC 2283	ASCII , PDF	Multiprotocol Extensions for BGP-4	T. Bates, R. Chandra, D. Katz, Y. Rekhter	February 1998	Obsoleted by RFC 2858	Proposed Standard
RFC 2385	ASCII , PDF	Protection of BGP Sessions via the TCP MD5 Signature Option	A. Heffernan	August 1998	Obsoleted by RFC 5925 , Updated by RFC 6691 , Errata	Proposed Standard
RFC 2439	ASCII , PDF	BGP Route Flap Damping	C. Villamizar, R. Chandra, R. Govindan	November 1998	Errata	Proposed Standard
RFC 2519	ASCII , PDF	A Framework for Inter-Domain Route Aggregation	E. Chen, J. Stewart	February 1999		Informational
RFC 2545	ASCII , PDF	Use of BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing	P. Marques, F. Dupont	March 1999		Proposed Standard

1996

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1999



RFC 2547	ASCII, PDF	BGP/MPLS VPNs	E. Rosen, Y. Rekhter	March 1999	Obsoleted by RFC 4364	Informational
RFC 2796	ASCII, PDF	BGP Route Reflection - An Alternative to Full Mesh IBGP	T. Bates, R. Chandra, E. Chen	April 2000	Obsoleted by RFC 4456 , Updates RFC 1966	Proposed Standard
RFC 2842	ASCII, PDF	Capabilities Advertisement with BGP-4	R. Chandra, J. Scudder	May 2000	Obsoleted by RFC 3392	Proposed Standard
RFC 2858	ASCII, PDF	Multiprotocol Extensions for BGP-4	T. Bates, Y. Rekhter, R. Chandra, D. Katz	June 2000	Obsoletes RFC 2283 , Obsoleted by RFC 4760 , Errata	Proposed Standard
RFC 2918	ASCII, PDF	Route Refresh Capability for BGP-4	E. Chen	September 2000	Updated by RFC 7313	Proposed Standard
RFC 3065	ASCII, PDF	Autonomous System Confederations for BGP	P. Traina, D. McPherson, J. Scudder	February 2001	Obsoletes RFC 1965 , Obsoleted by RFC 5065 , Errata	Proposed Standard
RFC 3107	ASCII, PDF	Carrying Label Information in BGP-4	Y. Rekhter, E. Rosen	May 2001	Obsoleted by RFC 8277 , Updated by RFC 6790 , Errata	Proposed Standard
RFC 3166	ASCII, PDF	Request to Move RFC 1403 to Historic Status	D. Meyer, J. Scudder	August 2001		Informational
RFC 3167	ASCII, PDF	Request to Move RFC 1745 to Historic Status	D. Meyer, J. Scudder	August 2001		Informational
RFC 3219	ASCII, PDF	Telephony Routing over IP (TRIP)	J. Rosenberg, H. Salama, M. Squire	January 2002	Errata	Proposed Standard
RFC 3221	ASCII, PDF	Commentary on Inter-Domain Routing in the Internet	G. Huston	December 2001		Informational
RFC 3345	ASCII, PDF	Border Gateway Protocol (BGP) Persistent Route Oscillation Condition	D. McPherson, V. Gill, D. Walton, A. Retana	August 2002	Errata	Informational

1999

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2002



RFC 3392	ASCII, PDF	Capabilities Advertisement with BGP-4	R. Chandra, J. Scudder	November 2002	Obsoletes RFC 2842 , Obsoleted by RFC 5492	Draft Standard
RFC 3562	ASCII, PDF	Key Management Considerations for the TCP MD5 Signature Option	M. Leech	July 2003		Informational
RFC 3765	ASCII, PDF	NOPEER Community for Border Gateway Protocol (BGP) Route Scope Control	G. Huston	April 2004		Informational
RFC 3882	ASCII, PDF	Configuring BGP to Block Denial-of-Service Attacks	D. Turk	September 2004		Informational
RFC 4098	ASCII, PDF	Terminology for Benchmarking BGP Device Convergence in the Control Plane	H. Berkowitz, E. Davies, Ed., S. Hares, P. Krishnaswamy, M. Lepp	June 2005		Informational
RFC 4223	ASCII, PDF	Reclassification of RFC 1863 to Historic	P. Savola	October 2005	Obsoletes RFC 1863	Informational
RFC 4264	ASCII, PDF	BGP Wedgies	T. Griffin, G. Huston	November 2005		Informational
RFC 4271	ASCII, PDF	A Border Gateway Protocol 4 (BGP-4)	Y. Rekhter, Ed., T. Li, Ed., S. Hares, Ed.	January 2006	Obsoletes RFC 1771 , Updated by RFC 6286 , RFC 6608 , RFC 6793 , RFC 7606 , RFC 7607 , RFC 7705 , RFC 8212 , Errata	Draft Standard
RFC 4272	ASCII, PDF	BGP Security Vulnerabilities Analysis	S. Murphy	January 2006		Informational

2002

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2006



RFC 4273	ASCII, PDF	Definitions of Managed Objects for BGP-4	J. Haas, Ed., S. Hares, Ed.	January 2006	Obsoletes RFC 1269 , RFC 1657 , Errata	Proposed Standard
RFC 4274	ASCII, PDF	BGP-4 Protocol Analysis	D. Meyer, K. Patel	January 2006	Errata	Informational
RFC 4275	ASCII, PDF	BGP-4 MIB Implementation Survey	S. Hares, D. Hares	January 2006	Errata	Informational
RFC 4276	ASCII, PDF	BGP-4 Implementation Report	S. Hares, A. Retana	January 2006		Informational
RFC 4277	ASCII, PDF	Experience with the BGP-4 Protocol	D. McPherson, K. Patel	January 2006	Errata	Informational
RFC 4278	ASCII, PDF	Standards Maturity Variance Regarding the TCP MD5 Signature Option (RFC 2385) and the BGP-4 Specification	S. Bellovin, A. Zinin	January 2006		Informational
RFC 4360	ASCII, PDF	BGP Extended Communities Attribute	S. Sangli, D. Tappan, Y. Rekhter	February 2006	Updated by RFC 7153 , RFC 7606 , Errata	Proposed Standard
RFC 4364	ASCII, PDF	BGP/MPLS IP Virtual Private Networks (VPNs)	E. Rosen, Y. Rekhter	February 2006	Obsoletes RFC 2547 , Updated by RFC 4577 , RFC 4684 , RFC 5462 , Errata	Proposed Standard
RFC 4365	ASCII, PDF	Applicability Statement for BGP/MPLS IP Virtual Private Networks (VPNs)	E. Rosen	February 2006	Errata	Informational
RFC 4381	ASCII, PDF	Analysis of the Security of BGP/MPLS IP Virtual Private Networks (VPNs)	M. Behringer	February 2006		Informational
RFC 4382	ASCII, PDF	MPLS/BGP Layer 3 Virtual Private Network (VPN) Management Information Base	T. Nadeau, Ed., H. van der Linde, Ed.	February 2006	Errata	Proposed Standard

2006

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2006



RFC 4384 a.k.a. BCP 114	ASCII , PDF	BGP Communities for Data Collection	D. Meyer	February 2006	Errata	Best Current Practice
RFC 4451	ASCII , PDF	BGP MULTI_EXIT_DISC (MED) Considerations	D. McPherson, V. Gill	March 2006		Informational
RFC 4456	ASCII , PDF	BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)	T. Bates, E. Chen, R. Chandra	April 2006	Obsoletes RFC 2796 , RFC 1966 , Updated by RFC 7606 , Errata	Draft Standard
RFC 4486	ASCII , PDF	Subcodes for BGP Cease Notification Message	E. Chen, V. Gillet	April 2006	Updated by RFC 8203	Proposed Standard
RFC 4576	ASCII , PDF	Using a Link State Advertisement (LSA) Options Bit to Prevent Looping in BGP/MPLS IP Virtual Private Networks (VPNs)	E. Rosen, P. Psenak, P. Pillay-Esnault	June 2006		Proposed Standard
RFC 4577	ASCII , PDF	OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs)	E. Rosen, P. Psenak, P. Pillay-Esnault	June 2006	Updates RFC 4364 , Errata	Proposed Standard
RFC 4659	ASCII , PDF	BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN	J. De Clercq, D. Ooms, M. Carugi, F. Le Faucheur	September 2006	Errata	Proposed Standard
RFC 4684	ASCII , PDF	Constrained Route Distribution for Border Gateway Protocol/MultiProtocol Label Switching (BGP/MPLS) Internet Protocol (IP) Virtual Private Networks (VPNs)	P. Marques, R. Bonica, L. Fang, L. Martini, R. Raszuk, K. Patel, J. Guichard	November 2006	Updates RFC 4364 , Errata	Proposed Standard
RFC 4724	ASCII , PDF	Graceful Restart Mechanism for BGP	S. Sangli, E. Chen, R. Fernando, J. Scudder, Y. Rekhter	January 2007	Errata	Proposed Standard

2006

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2007



RFC 4760	ASCII , PDF	Multiprotocol Extensions for BGP-4	T. Bates, R. Chandra, D. Katz, Y. Rekhter	January 2007	Obsoletes RFC 2858 , Updated by RFC 7606 , Errata	Draft Standard
RFC 4761	ASCII , PDF	Virtual Private LAN Service (VPLS) Using BGP for Auto-Discovery and Signaling	K. Kompella, Ed., Y. Rekhter, Ed.	January 2007	Updated by RFC 5462	Proposed Standard
RFC 4781	ASCII , PDF	Graceful Restart Mechanism for BGP with MPLS	Y. Rekhter, R. Aggarwal	January 2007		Proposed Standard
RFC 4797	ASCII , PDF	Use of Provider Edge to Provider Edge (PE-PE) Generic Routing Encapsulation (GRE) or IP in BGP/MPLS IP Virtual Private Networks	Y. Rekhter, R. Bonica, E. Rosen	January 2007		Informational
RFC 4798	ASCII , PDF	Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE)	J. De Clercq, D. Ooms, S. Prevost, F. Le Faucheur	February 2007		Proposed Standard
RFC 4808	ASCII , PDF	Key Change Strategies for TCP-MD5	S. Bellovin	March 2007		Informational
RFC 4893	ASCII , PDF	BGP Support for Four-octet AS Number Space	Q. Vohra, E. Chen	May 2007	Obsoleted by RFC 6793	Proposed Standard
RFC 5004	ASCII , PDF	Avoid BGP Best Path Transitions from One External to Another	E. Chen, S. Sangli	September 2007		Proposed Standard
RFC 5065	ASCII , PDF	Autonomous System Confederations for BGP	P. Traina, D. McPherson, J. Scudder	August 2007	Obsoletes RFC 3065 , Errata	Draft Standard
RFC 5123	ASCII , PDF	Considerations in Validating the Path in BGP	R. White, B. Akyol	February 2008	Errata	Informational
RFC 5160	ASCII , PDF	Considerations of Provider-to-Provider Agreements for Internet-Scale Quality of Service (QoS)	P. Levis, M. Boucadair	March 2008		Informational

2007

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2008



RFC 5195	ASCII, PDF	BGP-Based Auto-Discovery for Layer-1 VPNs	H. Ould-Brahim, D. Fedyk, Y. Rekhter	June 2008		Proposed Standard
RFC 5291	ASCII, PDF	Outbound Route Filtering Capability for BGP-4	E. Chen, Y. Rekhter	August 2008	Errata	Proposed Standard
RFC 5292	ASCII, PDF	Address-Prefix-Based Outbound Route Filter for BGP-4	E. Chen, S. Sangli	August 2008		Proposed Standard
RFC 5492	ASCII, PDF	Capabilities Advertisement with BGP-4	J. Scudder, R. Chandra	February 2009	Obsoletes RFC 3392 , Errata	Draft Standard
RFC 5512	ASCII, PDF	The BGP Encapsulation Subsequent Address Family Identifier (SAFI) and the BGP Tunnel Encapsulation Attribute	P. Mohapatra, E. Rosen	April 2009		Proposed Standard
RFC 5543	ASCII, PDF	BGP Traffic Engineering Attribute	H. Ould-Brahim, D. Fedyk, Y. Rekhter	May 2009	Updated by RFC 7606	Proposed Standard
RFC 5549	ASCII, PDF	Advertising IPv4 Network Layer Reachability Information with an IPv6 Next Hop	F. Le Faucheur, E. Rosen	May 2009		Proposed Standard
RFC 5566	ASCII, PDF	BGP IPsec Tunnel Encapsulation Attribute	L. Berger, R. White, E. Rosen	June 2009		Proposed Standard
RFC 5575	ASCII, PDF	Dissemination of Flow Specification Rules	P. Marques, N. Sheth, R. Raszuk, B. Greene, J. Mauch, D. McPherson	August 2009	Updated by RFC 7674 , Errata	Proposed Standard
RFC 5640	ASCII, PDF	Load-Balancing for Mesh Softwires	C. Filsfils, P. Mohapatra, C. Pignataro	August 2009		Proposed Standard
RFC 5668	ASCII, PDF	4-Octet AS Specific BGP Extended Community	Y. Rekhter, S. Sangli, D. Tappan	October 2009		Proposed Standard

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RFC 5701	ASCII, PDF	IPv6 Address Specific BGP Extended Community Attribute	Y. Rekhter	November 2009	Updated by RFC 7153 , RFC 7606	Proposed Standard
RFC 5747	ASCII, PDF	4over6 Transit Solution Using IP Encapsulation and MP-BGP Extensions	J. Wu, Y. Cui, X. Li, M. Xu, C. Metz	March 2010		Experimental
RFC 5824	ASCII, PDF	Requirements for Supporting Customer Resource ReSerVation Protocol (RSVP) and RSVP Traffic Engineering (RSVP-TE) over a BGP/MPLS IP-VPN	K. Kumaki, Ed., R. Zhang, Y. Kamite	April 2010		Informational
RFC 5961	ASCII, PDF	Improving TCP's Robustness to Blind In-Window Attacks	A. Ramaiah, R. Stewart, M. Dalal	August 2010	Errata	Proposed Standard
RFC 6037	ASCII, PDF	Cisco Systems' Solution for Multicast in BGP/MPLS IP VPNs	E. Rosen, Ed., Y. Cai, Ed., IJ. Wijnands	October 2010		Historic
RFC 6198	ASCII, PDF	Requirements for the Graceful Shutdown of BGP Sessions	B. Decraene, P. Francois, C. Pelsser, Z. Ahmad, A.J. Elizondo Armengol, T. Takeda	April 2011		Informational
RFC 6286	ASCII, PDF	Autonomous-System-Wide Unique BGP Identifier for BGP-4	E. Chen, J. Yuan	June 2011	Updates RFC 4271 , Errata	Proposed Standard
RFC 6368	ASCII, PDF	Internal BGP as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs)	P. Marques, R. Raszuk, K. Patel, K. Kumaki, T. Yamagata	September 2011	Updated by RFC 7606 , Errata	Proposed Standard
RFC 6382 a.k.a. BCP 169	ASCII, PDF	Unique Origin Autonomous System Numbers (ASNs) per Node for Globally Anycasted Services	D. McPherson, R. Donnelly, F. Scalzo	October 2011		Best Current Practice

2009

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2011



RFC 6397	ASCII, PDF	Multi-Threaded Routing Toolkit (MRT) Border Gateway Protocol (BGP) Routing Information Export Format with Geo-Location Extensions	T. Manderson	October 2011		Proposed Standard
RFC 6472 a.k.a. BCP 172	ASCII, PDF	Recommendation for Not Using AS_SET and AS_CONFED_SET in BGP	W. Kumari, K. Sriram	December 2011		Best Current Practice
RFC 6480	ASCII, PDF	An Infrastructure to Support Secure Internet Routing	M. Lepinski, S. Kent	February 2012		Informational
RFC 6482	ASCII, PDF	A Profile for Route Origin Authorizations (ROAs)	M. Lepinski, S. Kent, D. Kong	February 2012	Errata	Proposed Standard
RFC 6483	ASCII, PDF	Validation of Route Origination Using the Resource Certificate Public Key Infrastructure (PKI) and Route Origin Authorizations (ROAs)	G. Huston, G. Michaelson	February 2012		Informational
RFC 6513	ASCII, PDF	Multicast in MPLS/BGP IP VPNs	E. Rosen, Ed., R. Aggarwal, Ed.	February 2012	Updated by RFC 7582 , RFC 7900 , RFC 7988 , Errata	Proposed Standard
RFC 6514	ASCII, PDF	BGP Encodings and Procedures for Multicast in MPLS/BGP IP VPNs	R. Aggarwal, E. Rosen, T. Morin, Y. Rekhter	February 2012	Updated by RFC 6515 , RFC 6625 , RFC 7385 , RFC 7441 , RFC 7582 , RFC 7899 , RFC 7900 , RFC 7902 , RFC 7988 , Errata	Proposed Standard
RFC 6515	ASCII, PDF	IPv4 and IPv6 Infrastructure Addresses in BGP Updates for Multicast VPN	R. Aggarwal, E. Rosen	February 2012	Updates RFC 6514	Proposed Standard

2011

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2012



RFC 6517	ASCII, PDF	Mandatory Features in a Layer 3 Multicast BGP/MPLS VPN Solution	T. Morin, Ed., B. Niven-Jenkins, Ed., Y. Kamite, R. Zhang, N. Leymann, N. Bitar	February 2012		Informational
RFC 6565	ASCII, PDF	OSPFv3 as a Provider Edge to Customer Edge (PE-CE) Routing Protocol	P. Pillay-Esnault, P. Moyer, J. Doyle, E. Ertekin, M. Lundberg	June 2012		Proposed Standard
RFC 6608	ASCII, PDF	Subcodes for BGP Finite State Machine Error	J. Dong, M. Chen, A. Suryanarayana	May 2012	Updates RFC 4271	Proposed Standard
RFC 6624	ASCII, PDF	Layer 2 Virtual Private Networks Using BGP for Auto-Discovery and Signaling	K. Kompella, B. Kothari, R. Cherukuri	May 2012		Informational
RFC 6769	ASCII, PDF	Simple Virtual Aggregation (S-VA)	R. Raszuk, J. Heitz, A. Lo, L. Zhang, X. Xu	October 2012		Informational
RFC 6774	ASCII, PDF	Distribution of Diverse BGP Paths	R. Raszuk, Ed., R. Fernando, K. Patel, D. McPherson, K. Kumaki	November 2012		Informational
RFC 6793	ASCII, PDF	BGP Support for Four-Octet Autonomous System (AS) Number Space	Q. Vohra, E. Chen	December 2012	Obsoletes RFC 4893 , Updates RFC 4271 , Errata	Proposed Standard
RFC 6811	ASCII, PDF	BGP Prefix Origin Validation	P. Mohapatra, J. Scudder, D. Ward, R. Bush, R. Austein	January 2013		Proposed Standard
RFC 6907	ASCII, PDF	Use Cases and Interpretations of Resource Public Key Infrastructure (RPKI) Objects for Issuers and Relying Parties	T. Manderson, K. Sriram, R. White	March 2013		Informational

2012

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2013



RFC 6916 a.k.a. BCP 182	ASCII , PDF	Algorithm Agility Procedure for the Resource Public Key Infrastructure (RPKI)	R. Gagliano, S. Kent, S. Turner	April 2013		Best Current Practice
RFC 6938	ASCII , PDF	Deprecation of BGP Path Attributes: DPA, ADVERTISER, and RCID_PATH / CLUSTER_ID	J. Scudder	May 2013		Proposed Standard
RFC 6952	ASCII , PDF	Analysis of BGP, LDP, PCEP, and MSDP Issues According to the Keying and Authentication for Routing Protocols (KARP) Design Guide	M. Jethanandani, K. Patel, L. Zheng	May 2013		Informational
RFC 7024	ASCII , PDF	Virtual Hub-and-Spoke in BGP/MPLS VPNs	H. Jeng, J. Uttaro, L. Jalil, B. Decraene, Y. Rekhter, R. Aggarwal	October 2013		Proposed Standard
RFC 7132	ASCII , PDF	Threat Model for BGP Path Security	S. Kent, A. Chi	February 2014	Errata	Informational
RFC 7153	ASCII , PDF	IANA Registries for BGP Extended Communities	E. Rosen, Y. Rekhter	March 2014	Updates RFC 4360 , RFC 5701	Proposed Standard
RFC 7289	ASCII , PDF	Carrier-Grade NAT (CGN) Deployment with BGP/MPLS IP VPNs	V. Kuarsingh, Ed., J. Cianfarani	June 2014		Informational
RFC 7311	ASCII , PDF	The Accumulated IGP Metric Attribute for BGP	P. Mohapatra, R. Fernando, E. Rosen, J. Uttaro	August 2014		Proposed Standard
RFC 7313	ASCII , PDF	Enhanced Route Refresh Capability for BGP-4	K. Patel, E. Chen, B. Venkatachalapathy	July 2014	Updates RFC 2918	Proposed Standard
RFC 7353	ASCII , PDF	Security Requirements for BGP Path Validation	S. Bellovin, R. Bush, D. Ward	August 2014		Informational

2013

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2014



RFC 7432	ASCII, PDF	BGP MPLS-Based Ethernet VPN	A. Sajassi, Ed., R. Aggarwal, N. Bitar, A. Isaac, J. Uttaro, J. Drake, W. Henderickx	February 2015	Errata	Proposed Standard
RFC 7441	ASCII, PDF	Encoding Multipoint LDP (mLDP) Forwarding Equivalence Classes (FECs) in the NLRI of BGP MCAST-VPN Routes	IJ. Wijnands, E. Rosen, U. Joorde	January 2015	Updates RFC 6514	Proposed Standard
RFC 7447	ASCII, PDF	Deprecation of BGP Entropy Label Capability Attribute	J. Scudder, K. Kompella	February 2015	Updates RFC 6790	Proposed Standard
RFC 7454 a.k.a. BCP 194	ASCII, PDF	BGP Operations and Security	J. Durand, I. Pepelnjak, G. Doering	February 2015		Best Current Practice
RFC 7543	ASCII, PDF	Covering Prefixes Outbound Route Filter for BGP-4	H. Jeng, L. Jalil, R. Bonica, K. Patel, L. Yong	May 2015	Errata	Proposed Standard
RFC 7606	ASCII, PDF	Revised Error Handling for BGP UPDATE Messages	E. Chen, Ed., J. Scudder, Ed., P. Mohapatra, K. Patel	August 2015	Updates RFC 1997 , RFC 4271 , RFC 4360 , RFC 4456 , RFC 4760 , RFC 5543 , RFC 5701 , RFC 6368	Proposed Standard
RFC 7607	ASCII, PDF	Codification of AS 0 Processing	W. Kumari, R. Bush, H. Schiller, K. Patel	August 2015	Updates RFC 4271 , Errata	Proposed Standard
RFC 7611	ASCII, PDF	BGP ACCEPT_OWN Community Attribute	J. Uttaro, P. Mohapatra, D. Smith, R. Raszuk, J. Scudder	August 2015		Proposed Standard
RFC 7674	ASCII, PDF	Clarification of the Flowspec Redirect Extended Community	J. Haas, Ed.	October 2015	Updates RFC 5575	Proposed Standard

2015

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RFC 7705	ASCII, PDF	Autonomous System Migration Mechanisms and Their Effects on the BGP AS_PATH Attribute	W. George, S. Amante	November 2015	Updates RFC 4271	Proposed Standard
RFC 7716	ASCII, PDF	Global Table Multicast with BGP Multicast VPN (BGP-MVPN) Procedures	J. Zhang, L. Giuliano, E. Rosen, Ed., K. Subramanian, D. Pacella	December 2015		Proposed Standard
RFC 7730	ASCII, PDF	Resource Public Key Infrastructure (RPKI) Trust Anchor Locator	G. Huston, S. Weiler, G. Michaelson, S. Kent	January 2016	Obsoletes RFC 6490	Proposed Standard
RFC 7747	ASCII, PDF	Basic BGP Convergence Benchmarking Methodology for Data-Plane Convergence	R. Papneja, B. Parise, S. Hares, D. Lee, I. Varlashkin	April 2016		Informational
RFC 7752	ASCII, PDF	North-Bound Distribution of Link-State and Traffic Engineering (TE) Information Using BGP	H. Gredler, Ed., J. Medved, S. Previdi, A. Farrel, S. Ray	March 2016		Proposed Standard
RFC 7789	ASCII, PDF	Impact of BGP Filtering on Inter-Domain Routing Policies	C. Cardona, P. Francois, P. Lucente	April 2016		Informational
RFC 7814	ASCII, PDF	Virtual Subnet: A BGP/MPLS IP VPN-Based Subnet Extension Solution	X. Xu, C. Jacquenet, R. Raszuk, T. Boyes, B. Fee	March 2016		Informational
RFC 7854	ASCII, PDF	BGP Monitoring Protocol (BMP)	J. Scudder, Ed., R. Fernando, S. Stuart	June 2016	Errata	Proposed Standard
RFC 7899	ASCII, PDF	Multicast VPN State Damping	T. Morin, Ed., S. Litkowski, K. Patel, Z. Zhang, R. Kebler, J. Haas	June 2016	Updates RFC 6514	Proposed Standard

2015

RFC Editor

2016



RFC 7900	ASCII, PDF	Extranet Multicast in BGP/IP MPLS VPNs	Y. Rekhter, Ed., E. Rosen, Ed., R. Aggarwal, Y. Cai, T. Morin	June 2016	Updates RFC 6513 , RFC 6514 , RFC 6625	Proposed Standard
RFC 7908	ASCII, PDF	Problem Definition and Classification of BGP Route Leaks	K. Sriram, D. Montgomery, D. McPherson, E. Osterweil, B. Dickson	June 2016		Informational
RFC 7911	ASCII, PDF	Advertisement of Multiple Paths in BGP	D. Walton, A. Retana, E. Chen, J. Scudder	July 2016		Proposed Standard
RFC 7938	ASCII, PDF	Use of BGP for Routing in Large-Scale Data Centers	P. Lapukhov, A. Premji, J. Mitchell, Ed.	August 2016		Informational
RFC 7947	ASCII, PDF	Internet Exchange BGP Route Server	E. Jasinska, N. Hilliard, R. Raszuk, N. Bakker	September 2016		Proposed Standard
RFC 7948	ASCII, PDF	Internet Exchange BGP Route Server Operations	N. Hilliard, E. Jasinska, R. Raszuk, N. Bakker	September 2016		Informational
RFC 7964	ASCII, PDF	Solutions for BGP Persistent Route Oscillation	D. Walton, A. Retana, E. Chen, J. Scudder	September 2016		Proposed Standard
RFC 8050	ASCII, PDF	Multi-Threaded Routing Toolkit (MRT) Routing Information Export Format with BGP Additional Path Extensions	C. Petrie, T. King	May 2017		Proposed Standard
RFC 8092	ASCII, PDF	BGP Large Communities Attribute	J. Heitz, Ed., J. Snijders, Ed., K. Patel, I. Bagdonas, N. Hilliard	February 2017	Errata	Proposed Standard
RFC 8093	ASCII, PDF	Deprecation of BGP Path Attribute Values 30, 31, 129, 241, 242, and 243	J. Snijders	February 2017		Proposed Standard

2016

RFC *Editor*

2017



RFC 8097	ASCII, PDF	BGP Prefix Origin Validation State Extended Community	P. Mohapatra, K. Patel, J. Scudder, D. Ward, R. Bush	March 2017		Proposed Standard
RFC 8195	ASCII, PDF	Use of BGP Large Communities	J. Snijders, J. Heasley, M. Schmidt	June 2017		Informational
RFC 8203	ASCII, PDF	BGP Administrative Shutdown Communication	J. Snijders, J. Heitz, J. Scudder	July 2017	Updates RFC 4486	Proposed Standard
RFC 8205	ASCII, PDF	BGPsec Protocol Specification	M. Lepinski, Ed., K. Sriram, Ed.	September 2017	Updated by RFC 8206	Proposed Standard
RFC 8206	ASCII, PDF	BGPsec Considerations for Autonomous System (AS) Migration	W. George, S. Murphy	September 2017	Updates RFC 8205	Proposed Standard
RFC 8207 a.k.a. BCP 211	ASCII, PDF	BGPsec Operational Considerations	R. Bush	September 2017		Best Current Practice
RFC 8208	ASCII, PDF	BGPsec Algorithms, Key Formats, and Signature Formats	S. Turner, O. Borchert	September 2017	Updates RFC 7935	Proposed Standard
RFC 8209	ASCII, PDF	A Profile for BGPsec Router Certificates, Certificate Revocation Lists, and Certification Requests	M. Reynolds, S. Turner, S. Kent	September 2017	Updates RFC 6487	Proposed Standard
RFC 8211	ASCII, PDF	Adverse Actions by a Certification Authority (CA) or Repository Manager in the Resource Public Key Infrastructure (RPKI)	S. Kent, D. Ma	September 2017		Informational
RFC 8212	ASCII, PDF	Default External BGP (EBGP) Route Propagation Behavior without Policies	J. Mauch, J. Snijders, G. Hankins	July 2017	Updates RFC 4271	Proposed Standard
RFC 8277	ASCII, PDF	Using BGP to Bind MPLS Labels to Address Prefixes	E. Rosen	October 2017	Obsoletes RFC 3107	Proposed Standard

2017

RFC Editor

2017



I protocolli di routing

Interior Gateway Protocol (IGP)

- **RIP** (Routing Information Protocol)
- **OSPF** (Open Shortest Path First)
- **EIGRP** (Enhanced Interior Gateway Routing Protocol)



Exterior Gateway Protocol (EGP)

- **BGP** (Border Gateway Protocol)

iBGP
dentro un AS



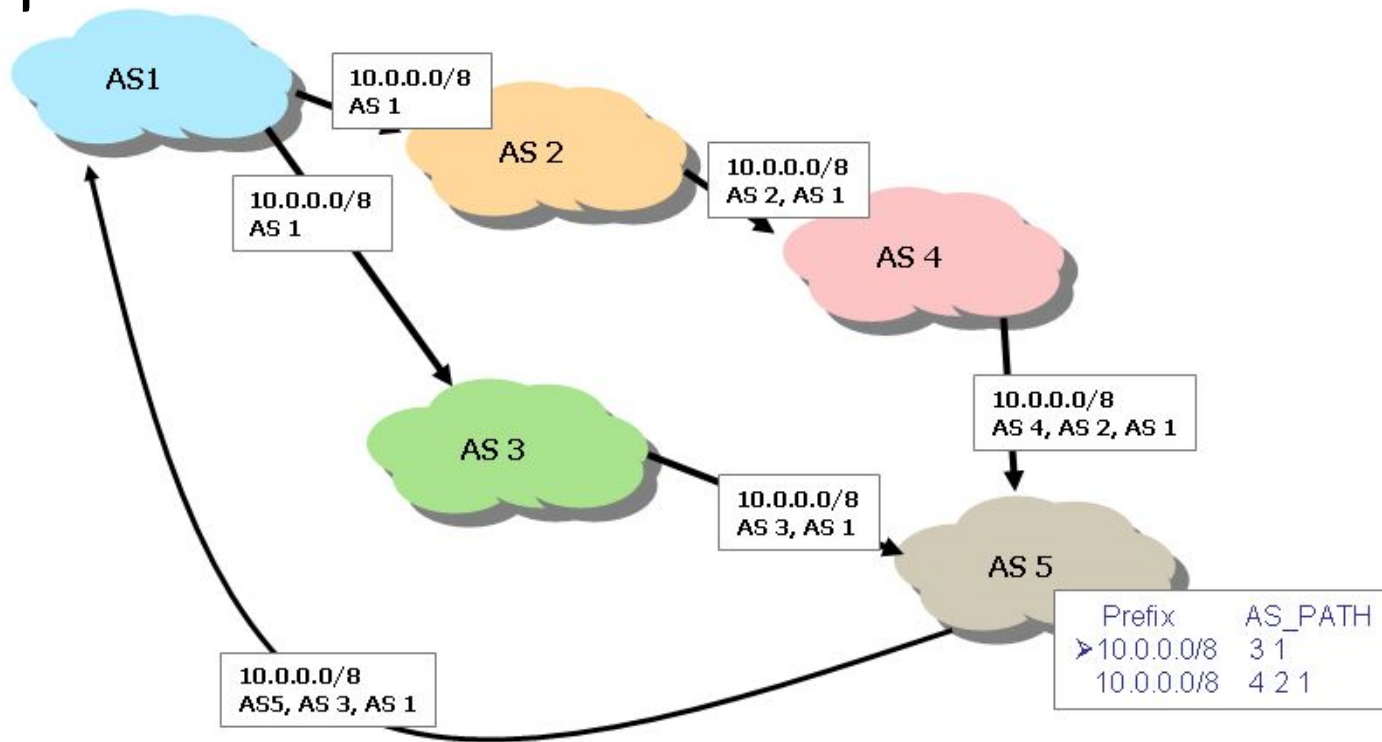
eBGP
tra AS diversi



BGP - come funziona

Peer vs Neighbor

Peering vs Transit



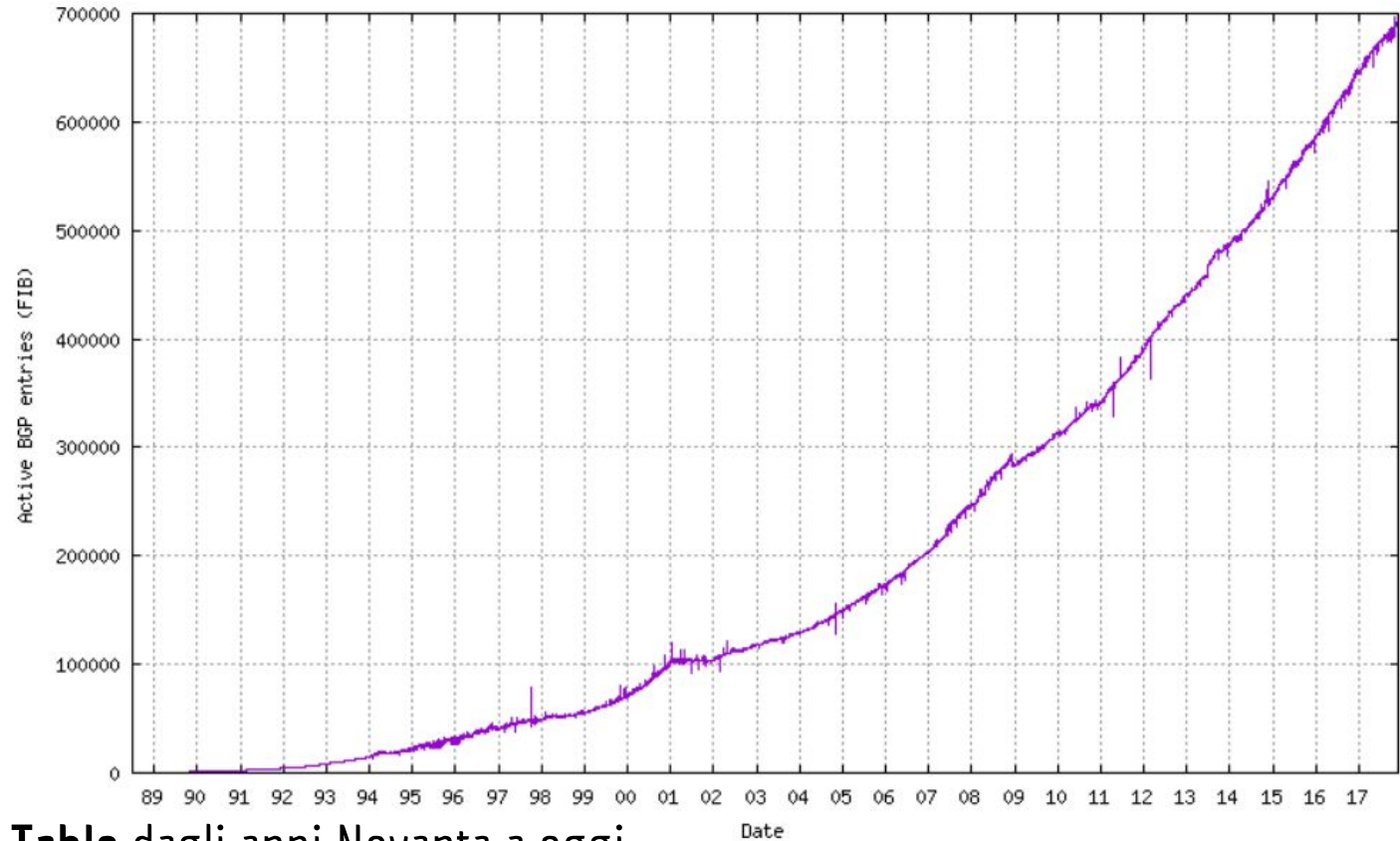
BGP table version is 113874499, local router ID is 128.223.51.103
 Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
 r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
 x best-external, a additional-path, c RIB-compressed,
 Origin codes: i - IGP, e - EGP, ? - incomplete
 RPKI validation codes: V valid, I invalid, N Not found

	Network	Next Hop	Metric	LocPrf	Weight	Path
*	1.0.4.0/24	195.66.232.239				0 5459 4637 1221 38803 38803 38803 56203 i
*		195.208.112.161				0 3277 39710 8359 4826 38803 56203 i
*		37.139.139.0				0 57866 6939 4826 38803 56203 i
*		202.93.8.242				0 24441 4826 38803 56203 i
*		12.0.1.63				0 7018 3257 4826 38803 56203 i
*		66.59.190.221				0 6539 577 6939 4826 38803 56203 i
*		66.110.0.86				0 6453 1299 4826 38803 56203 i
*		212.66.96.126				0 20912 6939 4826 38803 56203 i
*		162.251.163.2				0 53767 6939 4826 38803 56203 i
*		144.228.241.130	225			0 1239 4637 4637 4637 4637 1221 38803 38803 38803 56203 i
*		132.198.255.253				0 1351 10578 6939 4826 38803 56203 i
*		202.232.0.2				0 2497 4826 38803 56203 i
*		208.51.134.254	2514			0 3549 3356 1299 4826 38803 56203 i
*		154.11.98.225	0			0 852 6939 4826 38803 56203 i
*		103.247.3.45				0 58511 4826 38803 56203 i
*		194.85.40.15				0 3267 6939 4826 38803 56203 i
*		217.192.89.50				0 3303 6939 4826 38803 56203 i
*		103.197.104.1				0 134708 3491 4826 38803 56203 i
*		173.205.57.234				0 53364 3257 4826 38803 56203 i
*		208.74.64.40				0 19214 174 4826 38803 56203 i
*		64.71.137.241				0 6939 4826 38803 56203 i
*		4.69.184.193	0			0 3356 1299 4826 38803 56203 i
*		207.172.6.20	0			0 6079 6939 4826 38803 56203 i
*>		114.31.199.1				0 4826 38803 56203 i

BGP Path, Oregon Exchange BGP Route Viewer



Active BGP entries (FIB)



Sviluppo della **Routing Table** dagli anni Novanta a oggi

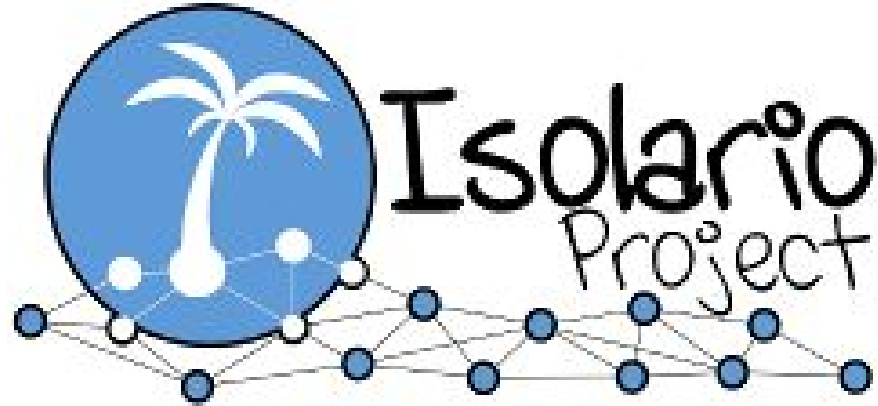


660855

Numero complessivo degli instradamenti a Internet oggi



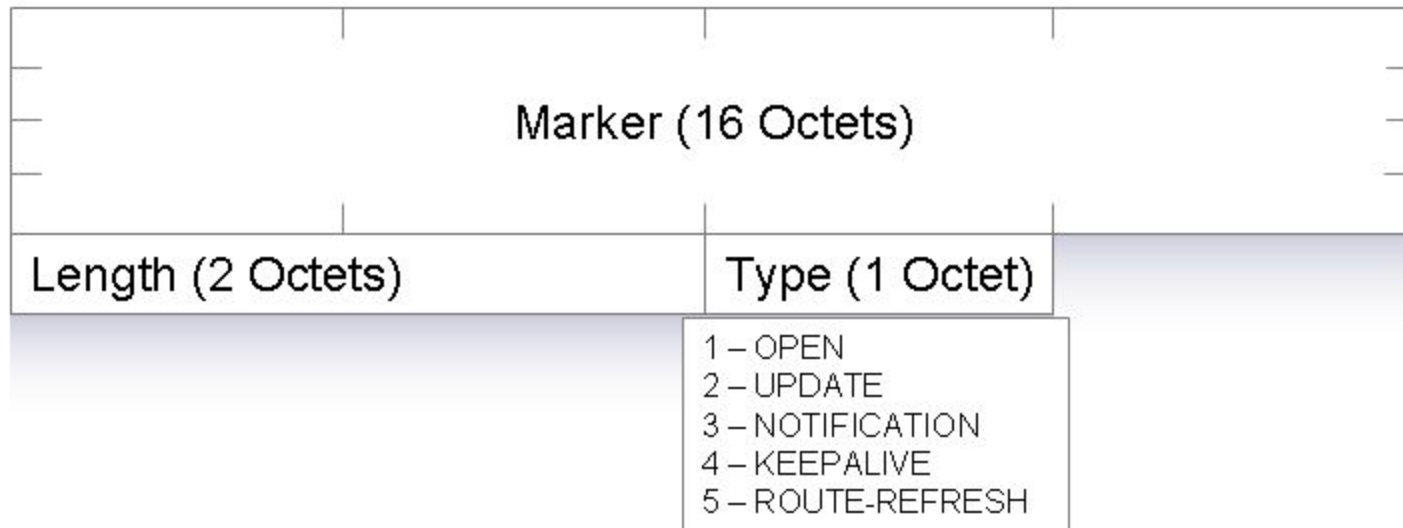
BGP flow con



Messaggi BGP (Type)

RFC 4271

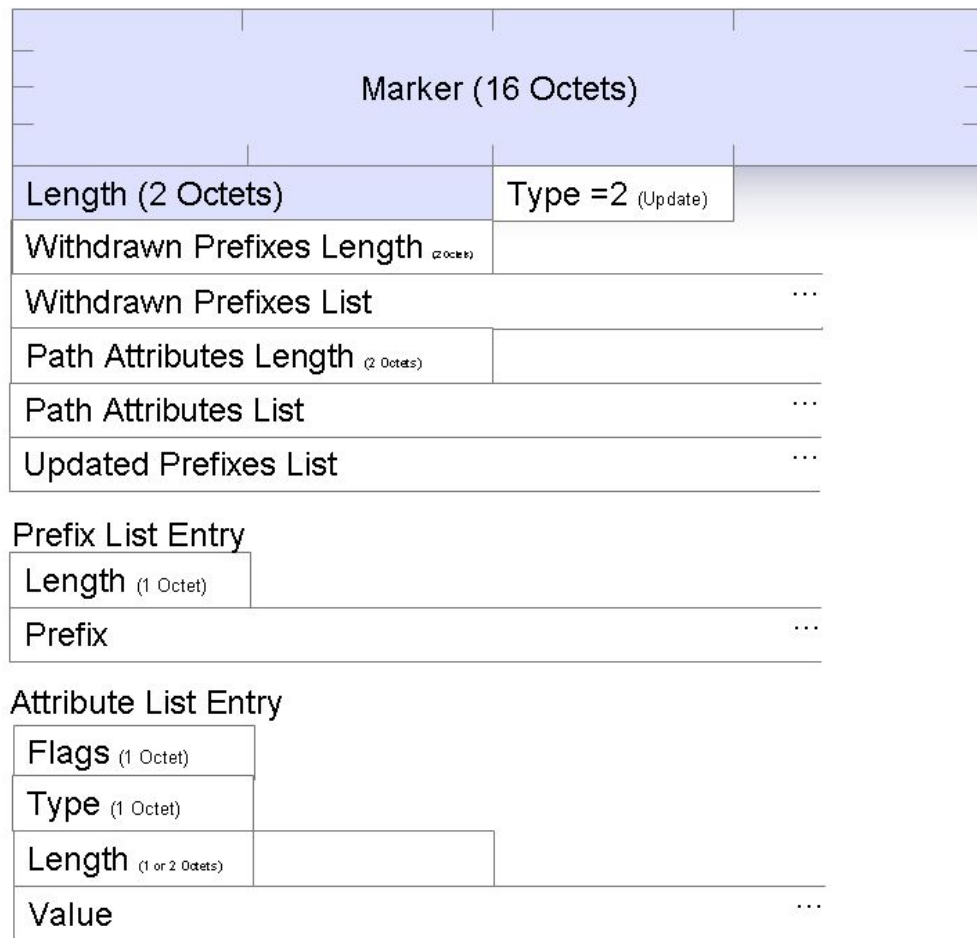
Gennaio 2006



Messaggi BGP (Update)

RFC 4271

Gennaio 2006



Attributi di BGP

RFC 4271

Gennaio 2006

Origin (da dove proviene il prefisso)

AS Path (Percorso del prefisso)

Next Hop (Indirizzo del router da usare per raggiungere il prefisso)

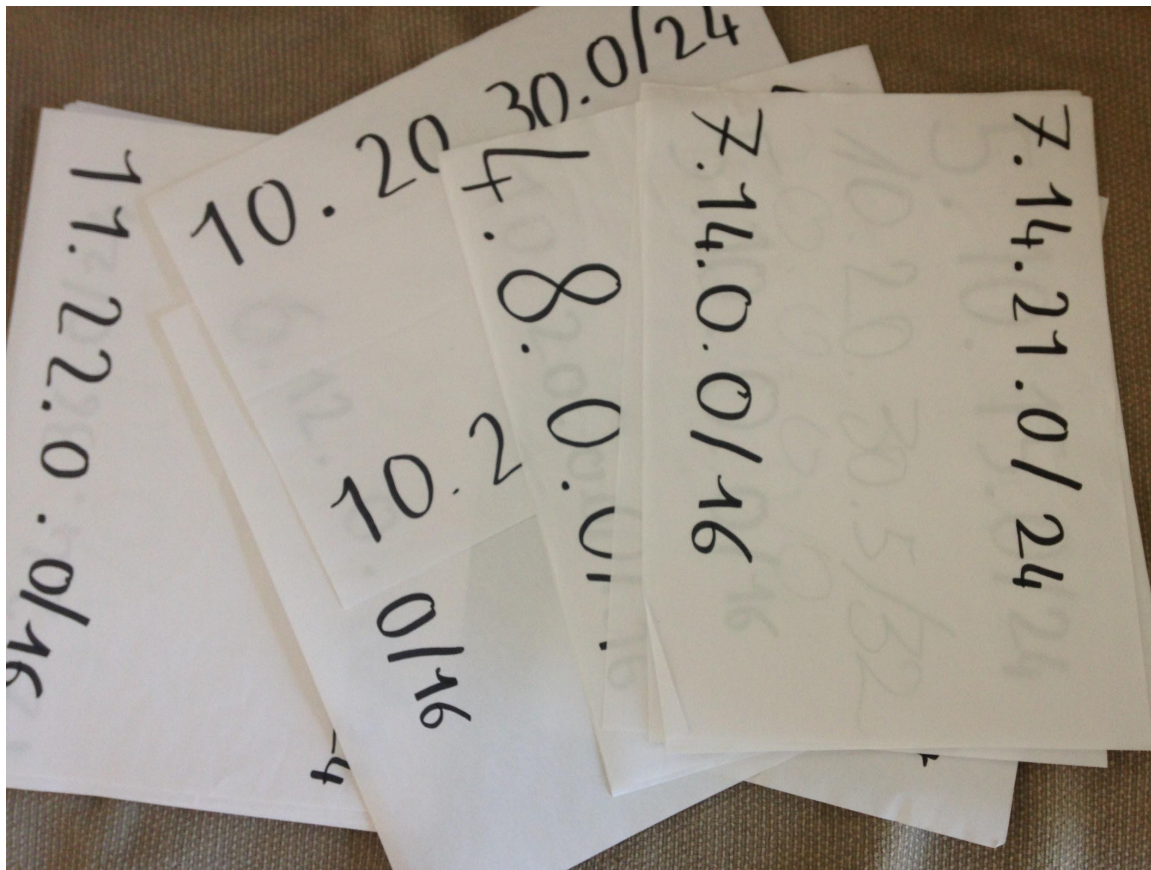
Local Preference (grado di preferenza di un prefisso, valido nello stesso AS)

Multiple Exit Discriminator (preferenza del punto di contatto tra AS sorgente e AS di destinazione)

Community (insieme di attributi locali abbinato a un percorso)

```
Border Gateway Protocol - UPDATE Message
Marker: ffffffffffffffffffffffffffffffffff
Length: 64
Type: UPDATE Message (2)
Withdrawn Routes Length: 0
Total Path Attribute Length: 39
  Path attributes
    Path Attribut - ORIGIN: EGP
    Path Attribut - AS_PATH: empty
    Path Attribut - NEXT_HOP: 192.168.0.33
    Path Attribut - MULTI_EXIT_DISC: 0
    Path Attribut - LOCAL_PREF: 100
    Path Attribut - COMMUNITIES: 65033:500 65033:600
  Network Layer Reachability Information (NLRI)
    10.0.0.0/8
```

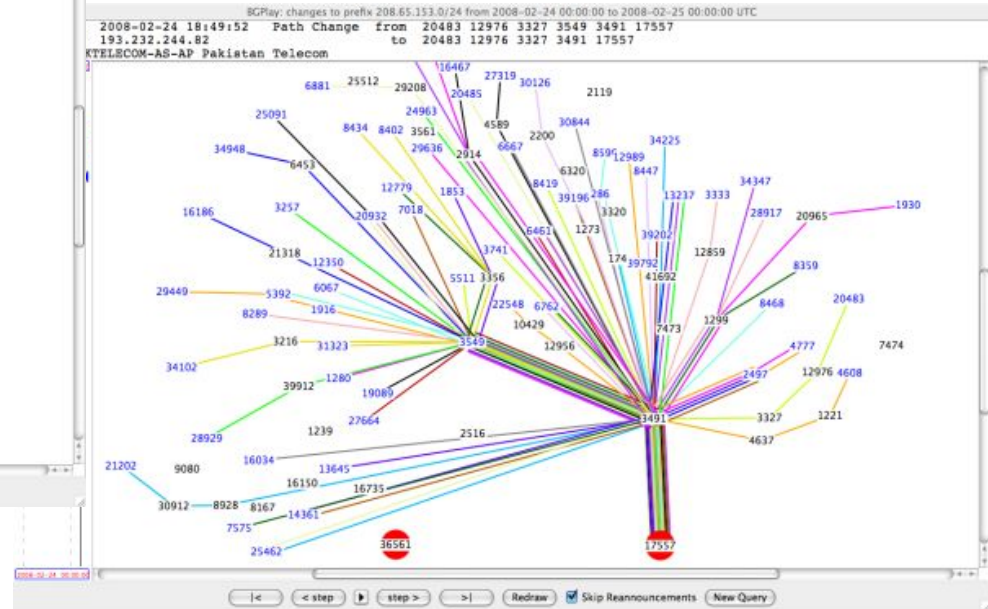
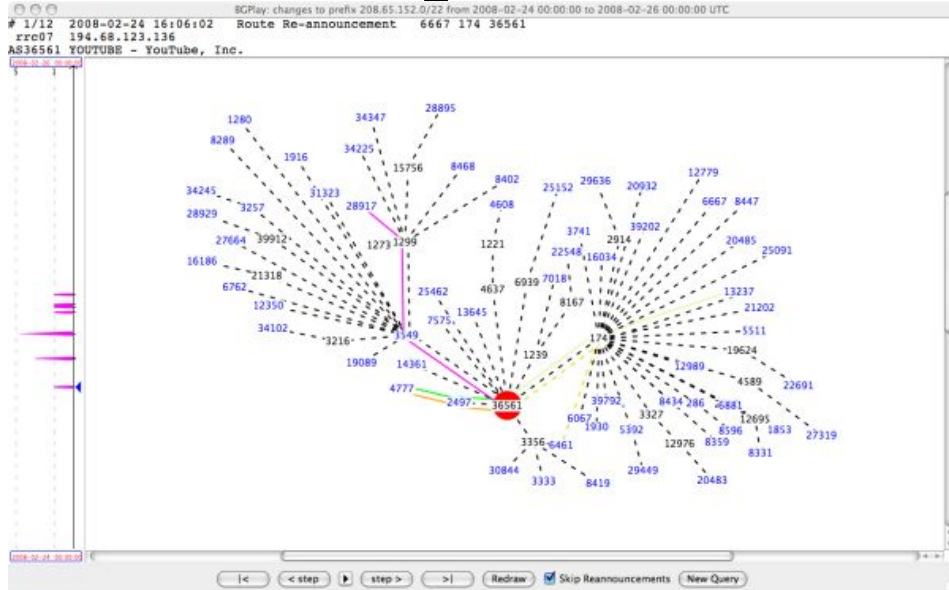




Live sessions



Dirottare gli instradamenti a Internet: YouTube



Sicurezza di BGP

BGP TTL Security Hack

MD5 Signature Option

IPSEC

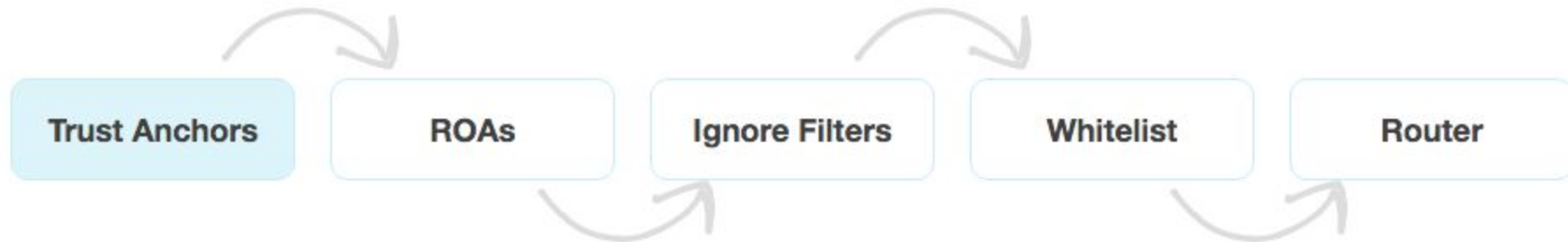
BGPsec

Secure Inter-Domain Routing (sidr)

About	Documents	Meetings	History	Photos	Email expansions	List archive	Tools »
Document	↕ Date	↕ Status	↕ IPR	↕ AD / Shepherd			
Active Internet-Drafts							
draft-ietf-sidr-rpki-validation-reconsidered-09 RPKI Validation Reconsidered	2017-11-15 22 pages	IESG Evaluation::AD Followup for 91 days Submitted to IESG for Publication: Proposed Standard Reviews: genart, opsdir		Alvaro Retana Chris Morrow			
draft-ietf-sidr-rtr-keying-14 Router Keying for BGPsec	2017-10-20 17 pages	I-D Exists Waiting for WG Chair Go-Ahead <i>Jul 2017</i>		Alvaro Retana			
draft-ietf-sidr-slurm-04 Simplified Local internet nUmer Resource Management with the RPKI	2017-03-13 17 pages	Publication Requested for 85 days Submitted to IESG for Publication: Proposed Standard		Alvaro Retana Chris Morrow			
RFCs							
RFC 6480 (was draft-ietf-sidr-arch) An Infrastructure to Support Secure Internet Routing	2012-02 24 pages	Informational RFC	1	Stewart Bryant			
RFC 6481 (was draft-ietf-sidr-repos-struct) A Profile for Resource Certificate Repository Structure	2012-02 15 pages	Proposed Standard RFC		Stewart Bryant			
RFC 6482 (was draft-ietf-sidr-roa-format) A Profile for Route Origin Authorizations (ROAs)	2012-02 9 pages	Proposed Standard RFC		Stewart Bryant			
RFC 6483 (was draft-ietf-sidr-roa-validation) Validation of Route Origination Using the Resource Certificate Public Key Infrastructure (PKI) and Route Origin Authorizations (ROAs)	2012-02 8 pages	Informational RFC	1	Adrian Farrel			
RFC 6484 (was draft-ietf-sidr-cp) Certificate Policy (CP) for the Resource Public Key Infrastructure (RPKI)	2012-02 35 pages	Best Current Practice RFC		Stewart Bryant			
RFC 6485 (was draft-ietf-sidr-rpki-algs) The Profile for Algorithms and Key Sizes for Use in the Resource Public Key Infrastructure (RPKI)	2012-02 6 pages	Proposed Standard RFC Obsoleted by RFC7935		Stewart Bryant			
RFC 6486 (was draft-ietf-sidr-rpki-manifests) Manifests for the Resource Public Key Infrastructure (RPKI)	2012-02 19 pages	Proposed Standard RFC		Stewart Bryant			
RFC 6487 (was draft-ietf-sidr-res-certs) A Profile for X.509 PKIX Resource Certificates	2012-02 32 pages	Proposed Standard RFC Updated by RFC7318, RFC8209		Stewart Bryant			
RFC 6488 (was draft-ietf-sidr-signed-object) Signed Object Template for the Resource Public Key Infrastructure (RPKI)	2012-02 13 pages	Proposed Standard RFC		Stewart Bryant			
RFC 6489 (was draft-ietf-sidr-keyroll) Certification Authority (CA) Key Rollover in the Resource Public Key Infrastructure (RPKI)	2012-02 10 pages	Best Current Practice RFC		Stewart Bryant			
RFC 6490 (was draft-ietf-sidr-ta) Resource Public Key Infrastructure (RPKI) Trust Anchor Locator	2012-02 7 pages	Proposed Standard RFC Obsoleted by RFC7730		Stewart Bryant			
RFC 6491 (was draft-ietf-sidr-iana-objects) Resource Public Key Infrastructure (RPKI) Objects Issued by IANA	2012-02 12 pages	Proposed Standard RFC		Stewart Bryant			
RFC 6492 (was draft-ietf-sidr-rescerts-provisioning) A Protocol for Provisioning Resource Certificates	2012-02 32 pages	Proposed Standard RFC		Stewart Bryant			
RFC 6493 (was draft-ietf-sidr-ghostbusters) The Resource Public Key Infrastructure (RPKI) Ghostbusters Record	2012-02 8 pages	Proposed Standard RFC		Stewart Bryant			
RFC 6810 (was draft-ietf-sidr-rpki-rtr) The Resource Public Key Infrastructure (RPKI) to Router Protocol	2013-01 27 pages	Proposed Standard RFC Updated by RFC8210		Stewart Bryant			



Quick Overview of BGP Origin Validation



Live system: <http://rpki.as59715.net/>



Questions?

