

ZebOS®  
Network Platform

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## BGP-4(+) Protocol Module

### Overview

IP Infusion's ZebOS® Network Platform BGP-4+ (Border Gateway Protocol) Protocol Module is portable software that implements BGP versions 4 and 4+, and provides optional VPN extensions for MPLS-VPN support. BGP-4+ supports both IPv4 and IPv6 extensions, and provides interoperability with popular BGP routers.

IETF-compliant optional VPN extensions work in conjunction with the ZebOS NSM and the ZebOS MPLS-LDP, RSVP-TE and MPLS Forwarder Modules. The BGP-4+ module supports an extensive set of features, including Route Flap Dampening, SNMP support, Graceful Restart, Autonomous System Confederations, and Route Reflection. With its optional VPN support and tight integration with the MPLS Label Distribution Protocol (LDP), ZebOS provides the industry's first portable Layer 3 VPN solution.

### BGP Multipath

ZebOS BGP4+ supports BGP Multipath for IPv4 address families. BGP Multipath is used to balance forwarding loads on eBGP or iBGP routers when a destination route can be reached through multiple equal cost nexthops. Equal cost is determined via the bestpath selection mechanism, and all paths that are equal cost with BGP bestpaths are considered multipath candidates.

### Features

- BGP Multipath for IPv4 Address Families
- iBGP and eBGP Load Balancing
- Multiple ECMP Nexthop Support
- Multiple Instance Support for IPv4 and IPv6
- Route Refresh for IPv4 and IPv6
- Graceful Restart for IPv4 and IPv6
- BGP-VPN Extensions for MPLS-VPN for IPv4 and IPv6
- Route Reflection, Route Server, Route Map, and Route Aggregation
- Route Flap Dampening for IPv4
- BGP Communities, Extended Communities, and Opaque Extended Communities Attributes
- BGP Confederations
- Update Source Configuration and Soft Reconfiguration
- Dynamic Capabilities Negotiation
- Outbound Route Filter for IPv4
- BGP-MD5 Authentication Extension
- Multiple AS instances for a speaker in the AS\_PATH
- ATOMIC\_AGGREGATE Processing
- 4-byte AS\_PATH

- Autonomous System Confederations
- BGP4 MIB
- BGP/MPLS Virtual Private Network support

## Requirements

- ZebOS Network Services Module
- ZebOS MPLS-VPN Module (Optional)
- MPLS Forwarder (required for VPN support)
- ZebOS Virtual Routing Modules (Optional for Virtual Routing Support)

## Standards Support

- RFC 1772 — Applications of BGP-4 in the Internet
- RFC 1997 — BGP Communities Attribute
- RFC 2385 — TCP MD5 Signature
- RFC 2439 — Route Flap Dampening
- RFC 2545 — BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing
- RFC 2796 — BGP Route Reflection-An Alternative to Full Mesh IBGP
- RFC 2918 — Route Refresh Capability for BGP-4
- RFC 3107 — Carrying Label Information in BGP-4
- RFC 3392 — Capabilities Advertisement with BGP-4
- RFC 4271 — A Border Gateway Protocol 4 (BGP-4)
- RFC 4273 — Definitions of Managed Objects for BGP-4
- RFC 4360 — BGP Extended Communities Attribute
- RFC 4364 — BGP/MPLS IP VPN Extensions for IPv6 VPN
- RFC 4456 — BGP Route Reflection
- RFC 4577 — OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPN)
- RFC 4659 — BGP-MPLS Virtual Private Network (VPN) Extension for IPv6 VPN
- RFC 4724 — Graceful Restart for BPG
- RFC 4760 — Multiprotocol Extensions for BGP-4
- RFC 4781 — Graceful Restart Mechanism for BGP with MPLS
- RFC 4798 — Connecting IPv6 Islands over UPv4 MPLS Using 6PE
- RFC 4893 — BGP Support for Four-octet AS Number Space
- RFC 5065 — Autonomous System Confederations for BGP
- RFC 5396 — Textual Representation of Autonomous System (AS) Numbers
- draft-ietf-l3vpn-as4octet-ext-community-03 — 4-byte AS-Specific Extended Community

## Standard Deliverables

- Source Code (written in ANSI-compliant C)
- Installation and Configuration Guides
- Command Reference
- Developer Guide