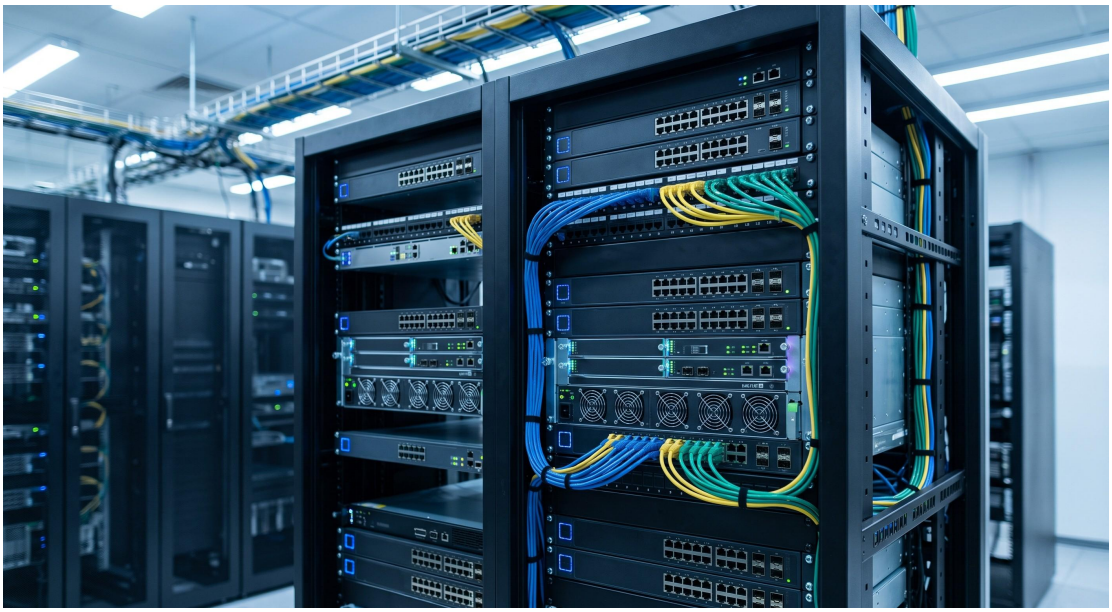
Cisco ASR Router BGP Route Map and Prefix List Filtering Configuration Template - Official Technical Overview & Hardware Datasheet

PRODUCT IDENTIFICATION

The Cisco ASR (Aggregation Services Router) 1000 Series represents a foundational element in modern carrier-grade and enterprise edge routing architectures. This document delineates the official configuration template and hardware-software co-design principles for implementing Border Gateway Protocol (BGP) route map and prefix list filtering mechanisms on the Cisco ASR platform. Designed to enforce granular routing policies, enhance network security postures, and optimize path selection in complex multi-homed environments, this template serves as the authoritative reference for network engineers seeking deterministic control over inbound and outbound route advertisements.

At the core of this specification is the integration of Cisco's IOS XE Software with the ASR's QuantumFlow Processor (QFP) architecture, enabling line-rate policy enforcement without compromising forwarding performance. The template framework is validated against the ASR 1001-X, ASR 1002-X, and ASR 1006-X chassis, ensuring broad applicability across the ASR portfolio. This document provides both a hardware datasheet context and a procedural guide for deploying sophisticated BGP filtering constructs that align with industry best

practices and operational security mandates.



CORE INTERNAL TOPOLOGY AND FORWARDING ENGINE

The Cisco ASR router employs a distributed, multi-core architecture that separates control plane operations from data plane forwarding, a critical design choice for BGP policy enforcement. The control plane, managed by the Route Processor (RP), hosts the BGP routing process and executes route map and prefix list logic. Upon successful policy evaluation, the resulting Forwarding Information Base (FIB) entries are programmed into the hardware forwarding engine, specifically the Embedded Services Processor (ESP), which performs line-rate packet switching.

The QuantumFlow Processor, central to the ESP, contains a parallel processing

array of up to 40 hardware threads per core, enabling simultaneous evaluation of multiple route filtering criteria. The internal topology features a dedicated Ternary Content-Addressable Memory (TCAM) for high-speed ACL and prefix lookups, ensuring that route map matching (including community lists, extended communities, and AS-path access lists) occurs with sub-microsecond latency. This hardware-assisted filtering ensures that the ASR can sustain throughput of up to 20 Gbps to 100 Gbps (model dependent) while applying complex BGP policies to tens of thousands of prefixes.

SWITCHING AND ROUTING SUBSYSTEM CAPABILITIES

The ASR platform integrates a high-speed backplane that facilitates non-blocking switching between the ESP and Network Interface Modules (NIMs). For BGP filtering, the critical subsystem is the Route Processor's memory hierarchy, which stores the BGP RIB, Adjacency RIB (Adj-RIB-In and Adj-RIB-Out), and the Local RIB. The configuration template leverages these subsystems by optimizing memory allocation for prefix-list storage and route-map cache entries. The hardware supports up to 8 GB of DRAM for the RP, accommodating BGP tables containing over 1 million IPv4 routes and 200,000 IPv6 routes. Additionally, the ESP includes dedicated SRAM for prefix-list lookups, enabling rapid match operations that are essential for real-time route advertisement filtering during BGP convergence events.

OPERATIONAL ADVANTAGES OF THE FILTERING TEMPLATE

Deploying the BGP route map and prefix list filtering template on the Cisco ASR offers distinct operational advantages, including:

- **Granular Traffic Engineering**: Control path selection based on specific prefix attributes, community tags, and AS-path length.
- **Security Hardening**: Implement inbound filters to reject route leaks, bogons, and private AS announcements, mitigating prefix hijacking risks.
- **Resource Optimization**: Reduce CPU utilization on the Route Processor by allowing the ESP to handle deny actions at line rate, offloading policy decisions from the control plane.
- **Simplified Maintenance**: Modular template design enables easy updates to prefix lists and route maps without needing to reconfigure neighbor statements globally.

SPECIFICATION MATRIX

Parameter	**Specification**
Form Factor	1RU (ASR 1001-X) / 2RU (ASR 1002-X) / 6RU (ASR 1006-X) Modular Chassis
Switching Capacity	Up to 2.5 Gbps (ASR 1001-X) to 100

	Gbps (ASR 1006-X with ESP-100)
Power Supply	Dual Hot-Swappable Redundant AC/DC (1+1 or 2+2 Redundancy)
Route Processor Memory	8 GB DRAM Standard (Expandable to 16 GB)
Forwarding Engine	Embedded Services Processor (ESP) with QuantumFlow Processor Array
BGP Prefix Capacity	1,000,000 IPv4 Routes / 200,000 IPv6 Routes
Maximum Route Maps per Neighbor	Unlimited (Limited by DRAM)
Maximum Prefix List Entries	Up to 1,000,000 per list (System-wide limit 4,000,000)
Hardware TCAM for ACL/Prefix	80,000 entries for IPv4 ACL and Prefix Lists
Operating Temperature	5°C to 40°C (Operating) / -40°C to 70° C (Storage)
MTBF (Mean Time Between Failures)	250,000 Hours at 25 ° C (Telcordia SR-332)
Software Support	Cisco IOS XE Release 16.12.x and Later (Everest-16.12, Gibraltar-17.x)

REGULATORY COMPLIANCE AND STANDARDS

The Cisco ASR 1000 Series complies with a comprehensive set of industry and regulatory standards, ensuring interoperability and adherence to global telecommunication requirements. The platform holds certifications for NEBS Level 3 (Network Equipment Building Systems), ETSI EN 300 386 for EMC, and UL 60950-1 for safety. For routing protocols, the ASR is fully compliant with RFC 4271 (BGP-4), RFC 4456 (Route Reflection), RFC 1997 (BGP Communities), and RFC 4360 (BGP Extended Communities). The filtering template adheres to the operational security guidelines outlined in MANRS (Mutually Agreed Norms for Routing Security), particularly concerning prefix filtering and RPKI (Resource Public Key Infrastructure) validation compatibility. Additionally, the platform supports MEF 9 and MEF 14 for Ethernet service definitions, making the BGP filtering mechanisms applicable in Carrier Ethernet environments.

