



Release Notes for Cisco Agile Metro, Release 1.0

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Cisco Agile Metro

Cisco Agile Metro is an architecture evolution of Cisco Converged SDN Transport (CSDN-T) architecture that is focused on converging network infrastructure in multiple dimensions to change the way networks are built. The Metro solution considers edge as a set of functions which can be enabled anywhere in the network.

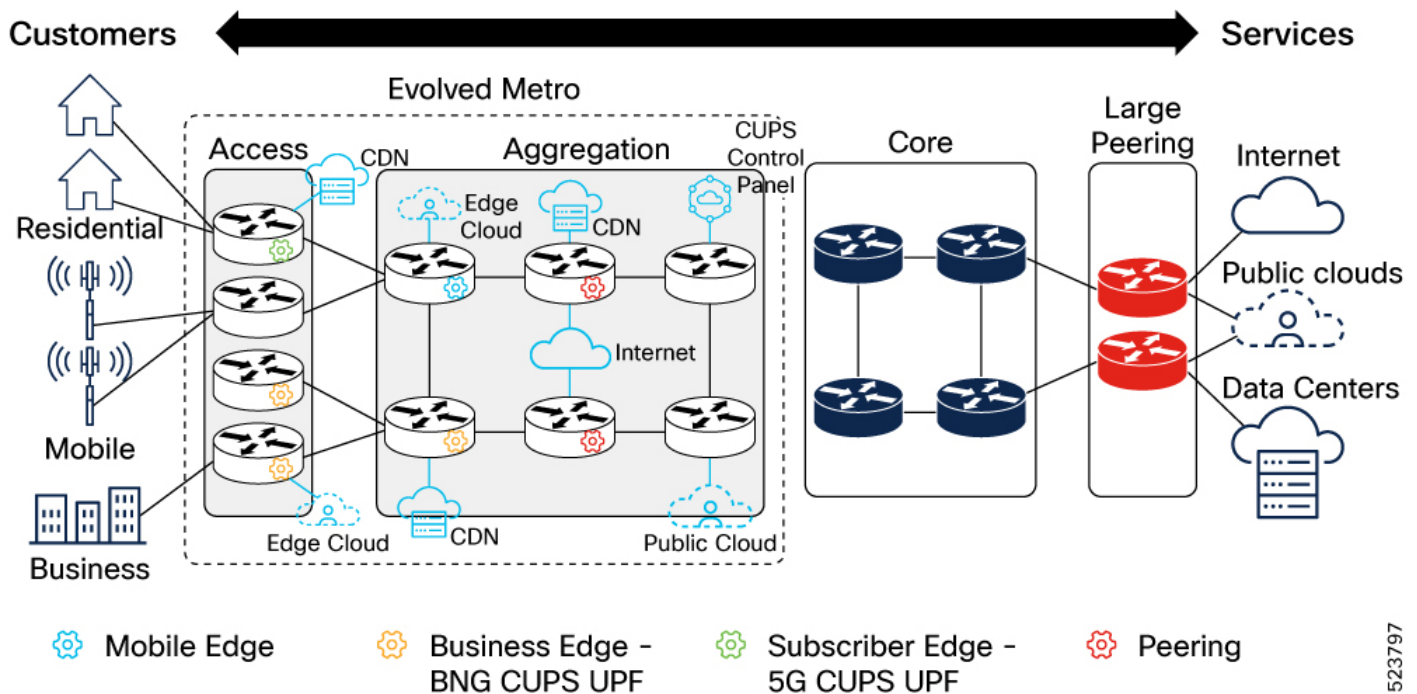
The Agile Metro architecture focuses on these key aspects:

- Enhanced scale and resiliency through distributed networking
- Simplified packet transport
- Simplified overlay services
- Enhanced automation

Agile Metro architecture

The Metro network evolution is driven by increasing bandwidth demands, resulting in network functions distributed in the network closer to the end user. This evolution is driving a consequent network architecture evolution. The classical split between access, pre-aggregation, aggregation, and edge leaves room for a more homogeneous network without distinct boundaries between the domains

Figure 1: Cisco Agile Metro architecture

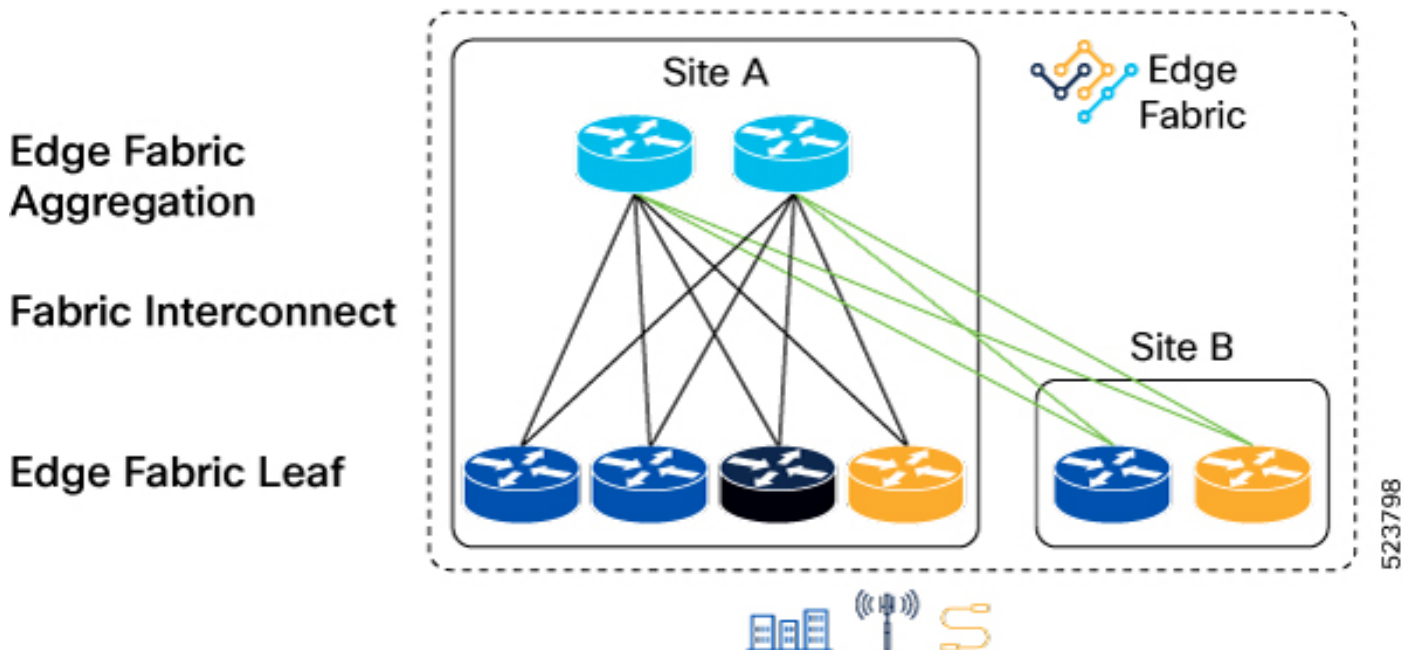


Metro Edge Fabric

This section details the new disaggregated Metro Edge Fabric, including its components and distributed control plane.

The Metro Edge Fabric is a component of Cisco Metro solution architecture that is designed to provide scalable edge services termination. The Metro Edge Fabric is designed to enhance network efficiency and scalability by separating network functions into distinct physical layers. Cisco Fabric-based Edge solution is a composition of multiple routers in a leaf-spine architecture to accommodate required functionality and scale that cannot be met in a standalone multi-service edge (MSE) model.

Figure 2: Metro Edge Fabric in Metro architecture



Edge Fabric leaf

Leaf nodes are the routers that are used for network service termination use cases. You can split the specific services across a set of leaf devices based on the design and network services. The leaf nodes may be collapsed into a universal leaf for all functions or split between different network or even VPN service type. All Cisco IOS XR platforms can be used as a leaf in the deployment depending on the feature requirements and feature scale.

Edge Fabric spine

The Edge Fabric aggregation routers or spines are the nodes that provides underlay connectivity to all leaf nodes that include service termination nodes, core networking connecting nodes, edge DC connecting nodes, and so on. These spine nodes act as L3/SR-MPLS switch that carry overlay services across leaf nodes. Spine nodes have advanced policy-based traffic management functionalities to support end-to-end QoS for selective overlay services.

Fabric interconnect

The fabric interconnects are the links connecting leaf nodes to spine nodes. Each leaf node must be connected to every spine node to provide maximum resiliency and load balancing across the fabric. It is recommended to standardize local interconnects to one type—copper (CU) or active optical cables (AOC) being the most cost-effective method. Interconnects may also utilize WAN connectivity in the case of remote leaf devices. Longer distances can be covered using Routed Optical Networking components such as ZR/ZR+, DP04QSDD-ER1, and QSFP-DD 100G ZR coherent optics.

Fabric control plane

The Fabric uses standard routing protocols; it does not use proprietary communication between the elements. This allows providers to easily insert any type of node, including third-party node, into the fabric.

Network technologies and protocols

The table gives a comparison of the common network technologies and protocols that are used in legacy networks vs. the Metro solution.

Table 1: Common network technologies and protocols used in legacy networks vs. the Metro solution

Network technology and protocol	Legacy network		Metro solution
xVPN Services	LDP	BGP	BGP for all L2VPN, and L3VPN
IP Network Scaling	BGP-LU		Segment Routing
Traffic Engineering Fast Reroute	RSVP-TE		
MPLS Overlay Protocol	RSVP-TE	LDP	
IPv6 Transport Overlay	None		
IP to DWDM Transition	Transponder or Muxponder		
	Grey Router Interface		Routed Optical Networking
Private Line Services	Dedicated OTN	Dedicated Ethernet over DWDM	Private Line Emulation
Subscriber BNG	Physical Integrated BNG		Cisco CUPS using Cloud Native BNG
PON Access	Dedicated PON Equipment		Cisco Routed Passive Optical Networking

Key pillars of Metro architecture

These are the key pillars of Metro architecture:

- Wide range of supported interfaces:
 - 1/10/25/50/100/400GE and beyond on unified family of Metro devices
 - Any speed user–network interface (UNI) with any service
 - High speed network-to-network interfaces (NNI) and Routed Optical Networking
- Simplified connectivity model and protocols:
 - Segment Routing IPv6 (SRv6) and SR-MPLS underlay networks; SRv6-TE and SR-MPLS TE for advanced Traffic Engineered use cases
 - Secured infrastructure using Trusted Cisco platforms and advanced distributed DDoS protection
 - Co-existence with legacy underlay and overlay technologies

- Business, residential, and mobile subscriber services:
 - EVPN and L3VPN in services layer
 - Private Line Emulation (PLE) for bit-transparent transport of Ethernet and non-Ethernet (OTN, SONET, Fiber Channel)
 - Next-generation subscriber edge using control plane and user plane separation (CUPS)
 - Converged business and subscriber access using Cisco Routed PON
- High performance end-to-end timing and synchronization
- Automation across all components in the architecture covering provisioning, monitoring, and service assurance

Benefits of Agile Metro

These are the key benefits of Agile Metro:

- Technology benefits:
 - High-capacity edge silicon
 - Convergence of network service functions
 - Flexible network design and systems to fit any size location in the network
- Business benefits:
 - Deliver services closer to users and applications
 - Cost savings
 - Sustainability benefits
- Operational benefits:
 - Improved services resilience
 - Network efficiency
 - Enhanced operations through network automation and orchestration

High-level use cases of Agile Metro

The Agile Metro architecture covers these high-level use cases:

- Next-generation residential subscriber networks deployments
- Enterprise business services
- Mobile network IP transport
- Centralized and edge data center connectivity including networks that are built to support artificial intelligence
- Internet peering, content delivery, and cloud connectivity

Agile Metro components

Main components of Agile Metro

The table lists the main hardware and software components of Agile Metro and their compatible versions.

Table 2: Compatibility matrix for Agile Metro components

Agile Metro component	Hardware or software component	Version
Cisco routers	Cisco ASR 9000 Series Routers Cisco NCS 540 Series Routers Cisco NCS 5500 Series Routers Cisco NCS 5700 Series Routers Cisco 8000 Series Routers Cisco 8700 Series Routers Cisco Catalyst (SD-WAN)	Not applicable
NOS for Cisco ASR 9000, NCS 540, NCS 5500, NCS 5700, Cisco 8000, and Cisco 8700 Series Routers	Cisco IOS XR Software	24.4.1
NOS for Cisco Catalyst 8500 Series Edge Platforms	Cisco IOS XE Software	17.15
Edge Fabric Management	Metro Fabric Manager Function Pack	1.0
DDoS Controller	Cisco Secure DDoS Edge Protection	24.07.09.2976
IP Controller	Cisco Crosswork Network Controller	7.0.1
Multi-Layer Controller	Cisco Crosswork Hierarchical Controller	9.0
Network Services Orchestrator	Cisco Crosswork Network Services Orchestrator	6.1.11.2
Workflow Management	Cisco Crosswork Workflow Manager	1.2
SD-WAN Controller	Cisco Catalyst SD-WAN Manager	17.15.1
Provider Connectivity Assurance Sensor Management	CPCA Sensor Control CPCA Orchestrator	22.x
PON Management	Cisco Routed PON Manager	5.0
CUPS Control Plane	Cisco Cloud Native BNG (cnBNG) Control Plane	2024.04.0 with Cloud Native Deployment Platform (CNDP) 24

Agile Metro component	Hardware or software component	Version
CUPS User Plane	Cisco Cloud Native BNG (cnBNG) User Plane: Cisco ASR 99XX modular chassis with Cisco ASR 9000 5th generation High Density Ethernet line cards: ASR 9902 ASR 9903	24.4.1
CnBNG CFP for Day-0 and Day-1 Management	CNBNG SMI-NSO CFP	2024.04.0

Supported Cisco IOS XR OS products for Agile Metro

The table lists the supported Cisco IOS XR OS products for Agile Metro.

Product	Product ID
Cisco ASR 9000 Series Routers	ASR 9902 ASR 9903
Cisco 8000 Series Routers (Q200-based)	8201-24H8FH 8201-32FH 8202-32FH-M Cisco 8608 (Centralized): 86-MPA-14H2FH-M 86-MPA-24Z-M 86-MPA-4FH-M
Cisco 8000 Series Routers (P100-based)	8711-32FH-M 8212-48FH-M
Cisco 8000 Series Routers (K100-based)	8712-MOD-M
Cisco NCS 5500 Series Routers	NCS 55A1: NCS-55A1-24Q6H-S NCS-55A1-24Q6H-SS (MACsec)
Cisco NCS 55A2 Series Routers Cisco NCS 57C3 Series Routers	NCS-55A2-MOD-SE NCS-57C3-MOD-SE-S NCS-55A2-MOD-S NCS-57C3-MOD-S

Product	Product ID
Cisco NCS 5700 Series Routers	NCS-57B1-5DSE-SYS NCS-57B1-6D24-SYS NCS-57D2-18DD NCS-57C1-48Q6-SYS
Line cards for Cisco NCS 5500 Series Routers	NC57-48Q2D-S NC57-48Q2D-SE-S NC57-36H6D-S
Cisco NCS 540 Series Routers	N540-24Z8Q2C-SYS N540-ACC-SYS N540-24Q8L2DD-SYS N540X-16Z4G8Q2C-D/A N540-28Z4C-SYS-D/A
Cisco IOS XRv 9000 Router	Cisco IOS XRv 9000
Cisco IOS XRd virtual router	Cisco IOS XRd vRouter

Automation components of Agile Metro

The table lists the main automation components of Agile Metro and their compatible versions.

Automation component	Component version
Cisco Crosswork Network Controller	7.0.1
Cisco Crosswork Hierarchical Controller	9.0
Cisco Crosswork Network Services Orchestrator	6.1.3.1
Cisco Crosswork Workflow Manager	1.2
Cisco Cloud Native BNG (cnBNG) Control Plane	2024.04.0 with Cloud Native Deployment Platform (CNDP) 24
Cisco Cloud Native BNG NSO SMI Deployer	2024.04.0
Crosswork Planning	7.0.1
Cisco Provider Connectivity Assurance	24.2
CX Fabric Manager	1.0

Caveats

To know about the open caveats associated with the Cisco Agile Metro components, see the product Release Notes for the respective release.

- [Release Notes for Cisco IOS XR Software products](#)
- [Release Notes for Cisco Crosswork Network Controller](#)

Related documentation

Use this Release Notes along with these referenced documents:

- Cisco Metro Solution Guide
- [Cisco Catalyst SD-WAN](#)
- [Cisco Crosswork Hierarchical Controller](#)
- [Cisco Crosswork Network Controller](#)
- [Cisco Crosswork Network Services Orchestrator](#)
- [Cisco Crosswork Workflow Manager](#)
- [Cloud Native BNG Control Plane](#)
- [Cloud Native BNG User Plane](#)
- [Cisco Provider Connectivity Assurance](#)
- [Cisco Routed Optical Networking](#)
- [Cisco Routed Passive Optical Networking](#)



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