

GFN SDN Controller User Manual

Multicast Service

Release 2.5.0

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1. Acronyms

- AD Administrative Domain
- AI Artificial intelligence
- ASIC Application Specific Integrated Circuit
- BGP Border Gateway Protocol
- BNG Border Network Gateway
- BRAS Broadband Remote Access Server
- BSS Business Support System
- CBS Committed Bust Size
- **CEN** -Carrier Ethernet Network
- CG-NAT Carrier Grade Network Address Translation
- CIR Committed Information Rate
- CLI Command Line Interface
- CPU Central Processing Unit
- CRM Customer Relationship Management
- CRUD Create, Read, Update, Delete
- DB Database
- DC Datacenter
- **DPI Deep Packet Inspection**
- DPID Data Path Identificator
- E2E End-to-End (services)

E-Access - OVC-based service with at least one UNI OVC End Point and one ENNI End Point

- EBS Excess Burst Size
- **EIR Excess Information Rate**
- E-LAN multipoint-to-multipoint EVC
- E-Line point-to-point EVC accordingly to MEF
- EMS Element Managements System
- ENNI External Network-to-Network Interface
- EP-LAN Ethernet Private LAN
- EPL Ethernet Private Line

E-Transit - OVC-based Carrier Ethernet service in which all OVC End Points are at ENNIs

- E-Tree point-to-multipoint EVC
- ETSI European Telecommunications Standards Institute
- EVC Ethernet Virtual Circuit
- EVPL Ethernet Virtual Private Line
- IGMP Internet Group Management Protocol
- LAN Local Area Network
- LPM Longest Prefix Match
- MEF Metro Ethernet Forum
- MPLS Multiprotocol Label Switching
- NAT Network Address Translation
- NBI North Bound Interface
- NE Network Element
- NPU Network Processing Unit
- NVF Network Functions Virtualization
- NFVI Network Functions Virtualization Infrastructure
- OAM Operations, Administration and Management
- OF OpenFlow protocol
- OF-DPA OpenFlow Data Plane Abstraction
- **ONF Open Networking Foundation**
- **OSS Operation Support System**
- **OVC Operator Virtual Connection**
- OVS Open vSwitch
- PNE Physical Network element
- PNF Physical Network Element
- PoP Point of Presence, see also Datacenter
- QinQ IEEE 802.1ad standard
- QoS Quality of Service
- RFC Request for Comments
- SBI South Bound Interface
- SDN Software Defined Network

- SLA Service Level Agreement
- SQL Structured Query Language
- SR Segment Routing
- SRAM Static Random Access Memory
- TAP Terminal Access Point
- TCAM Ternary Content Addressable Memory
- TE Traffic Engineering
- T/T Troubleticketing
- TTP Table Type Pattern
- UDF User-Defined Field
- UNI User Network Interface
- VLAN Virtual Local Area Network
- VIM Vurtual Infrastructure Manager
- VM Virtual Machine
- VNE Virtual Network Element
- VNF Virtual Network Function
- VNFD Virtual Network Function Descriptor
- VNFM Virtual Network Function Manager
- VPLS Virtual Private Area Network
- WAN Wide Area Network
- ZTP Zero Touch Provisioning

2. Multicast Service Review

Multicast is point-to-multipoint EVC service for Metro Ethernet network accordingly to MEF 6.2 and MEF 10.3 specification. Currently it is implemented as EVP-Tree with redundant root UNI. Point-to-Multipoint EVC



Multicast can work either in static mode or with IGMP Snooping support. Both IGMPv2 and IGMPv3 are supported.

Multicast service can span a lot of switches. Multicast is fully protected service, thus its path will be automatically recalculated in case of link/node failure if possible.

Multicast Service Attributes

Multicast service has following general attributes:

- ID
- Address
- Sources

ID is unique Multicast service identifier which is represented as string.

Address is group address.

Sources is array of sources.

3. Prerequisites

To use Multicast service Multicast application application has to be running on SDN Controller. Check if Multicast application is running can be done in two ways:

- Via controller CLI by using command *app show*, Multicast application status has to be *running*.
- Via Web UI, by going to controllers page

(Menu \rightarrow Inventory \rightarrow Controllers), Multicast application should be marked with \bigcirc icon

Nodes: 2 Active: 1 Standby: 1	Allowed Applications I2vpn-2.4.0.jar,frr-2.4.0.j	jar,mcast-2.4.0.jar,maclrn-2.4.0.jar,vp	ls-2.4.0.jar,swapper-2.4.0.jar,mirror-2.4	4.0.jar,tap-2.4.0.jar			
	Code word gateflow.net	Valid until 01.2099	Allowed Devices 6				
Node #1	-		Node #2				
Role	Uptime 3:27:54	os Linux	Role		Uptime 3:27:54		os Linux
Kernel Version 5.4.0-37-generic	Architecture amd64	Number of Cores 16	Kernel Version 5.4.0-37-gen	eric	Architecture amd64		Number of Cores 16
Total Memory 632 MB	Max Memory 3 GB	Free Memory 324 MB	Total Memory 496 MB		Max Memory 3 GB		Free Memory 269 MB
ZVPN VPLS	Tap Multic	ast FRR	L2VPN	VPLS	Тар	Multicast	FRR

4. Operation of Multicast Service

There are three generic ways to operate Multicast service:

- CLI
- REST API
- Web UI

These interfaces are described in details below.

<u>CLI</u>

CLI provides following command for operating Multicast service:

- multicast services
- multicast show

These commands will display list of currently existing Multicast services

multicast subscribers

This command will display list of Multicast service subscribers

• multicast sources

This command will display list of currently existing Multicast sources

• multicast tree

This command will display Multicast topology

• multicast UNI ports

This command will display all available UNI ports for Multicast services

For creating and updating Multicast services and sources please use either Web UI or REST API.

REST API

Multicast REST API implements a standard CRUD (Create, Read, Update, Delete) data manipulation paradigm. Any REST API call operates with data in JSON format. Below is an example of JSON file for REST API call to create Multicast service:

Below is an example of JSON file for REST API call to create Multicast source:

```
{
    "10.0.0.10" : {
        "main_root": {
            "dpid" : "00:00:00:00:00:00:00:01",
            "port" : 3
        },
        "seoncd_root": {
            "dpid" : "00:00:00:00:00:00:02",
            "port" : 3
        }
    }
}
```

REST API Service URLs

There are several REST API URLs available for Multicast:

Create Multicast services

http://sdn-node:8084/multicast/service (Method - POST)

Create Multicast source

http://sdn-node:8084/multicast/source (Method - POST)

Get Multicast services

http://sdn-node:8084/multicast/services (Method - GET)

Get Multicast sources

http://sdn-node:8084/multicast/sources (Method - GET)

• Delete Multicast service

http://sdn-node:8084/multicast/service/{id} (Method - DELETE)

• Delete Multicast source

http://sdn-node:8084/multicast/source/{id} (Method - DELETE)

To send a REST API call on Linux command line utility "curl" can be used as shown below:





For detailed description of all Multicast service and source JSON file fields format and constraints please refer to GFN SDN Controller Admin Manual.

<u>Web UI</u>

To access Multicast management graphic interface via web browser one has to login to GFN SDN Controller Web UI first as shown in the example below:



After logging in one has to open a full screen menu using icon

at the top bar and choose drop-down Menu->Services->MCAST section as shown below:



A Multicast services and sources lists will appear. Services list contains brief information about every existing Multicast service. Clicking on a service in the list will open service details page for corresponding service.

Ŷ MCAST	Devices Links		Links						
Fotal: 200 Active: 200 nactive: 0	Total 5	Active 5	inactive 0	Total 7	up 7	0	unti -	Ŭ	
Services					Sources				
			Search:			Search:			
t. Id		Address	Sources		Address	VLAN	IGMP		
multicast157		224.1.1.157	1		10.0.0.11	405	True		
multicast156		224.1.1.156	1		10.0.0.10	405	True		
multicast155		224.1.1.155	1		Address	VLAN	IGMP		
multicast154		224.1.1.154	1		Showing 1 to 2 of 2 antrias				
multicast159		224.1.1.159	1		Growing 1 to 2 of 2 entires				
multicast158		224.1.1.158	1				First	Last	
Id		Address	Sources						
Showing 1 to 6 of 200 entries									
			First 1 2 3 4	5 34 Last					

Sources list contains brief information about every existing Multicast source. Clicking on a source in the list will open source details page for corresponding source.

One can open Multicast submenu by clicking the floating button in the top-right corner of the screen.

Y MCAST		Links						
iotal: 200 Active: 200 nactive: 0	Total 5	Active 5	Inactive D	Total 7	UP 7		Down D	
ervices					Sources		L	+
			Search:			Search:		
t. Id		Address	Sources		Address	VLAN	IGMP	
multicast157		224.1.1.157	1		10.0.0.11	405	True	
multicast156		224.1.1.156	1		10.0.0.10	405	True	
multicast155		224.1.1.155	1		Address	VLAN	IGMP	
multicast154		224.1.1.154	1		01-1-1-0-10-10-10-10-10-10-10-10-10-10-1			
multicast159		224.1.1.159	1		Showing 1 to 2 of 2 entries			
multicast158		224.1.1.158	1				First	1 Last
ld		Address	Sources					
Showing 1 to 6 of 200 entries								
			First 1 2 3 4	5 34 Last				

To create a new Multicast service or source press the corresponding button in the submenu and the creation form will appear.

In the source creation form one can fill in general parameters for the source and add roots by filling in "Edit Root" form and pressing "Add root" button in the submenu.

 V MARX
 Source

 Y MARX
 Source address

 Note X00
 Source address

 Rods
 Source address

 I' BPB
 N Peri Neelee

 No data svalidée in table

 BPB
 Peri Neelee

 Rods

 Stowing 0 to 0 d'0 entries

To create source press "Save" button in the submenu. If source

was created successfully one will be redirected to new source details page. If something went wrong – a floating error message will appear.

To delete source press "Edit" button in the submenu, then press "Delete" button in the submenu. Source will be deleted and you will be redirected to Multicast services and sources lists.



Note: creating, editing and deleting services and sources functions are only available for users with admin privileges.

In the service creation form one can fill in general parameters for the service and add sources by selecting source and pressing "Add source" button in the submenu. Added sources can be deleted by pressing "Delete" button on the corresponding source.

MCAST	Service						
otal: 200 ctive: 200 active: 0	Service ID			Address			Ď
	Source						
ources							
						Search:	
Address	DPID 1	Port 1	Device 1	DPID 2	Port 2	Device 2	
			No data availat	ale in table			
Address	DPID 1	Port 1	Device 1	DPID 2	Port 2	Device 2	
Showing 0 to 0 of 0 entries							

To create service press "Save" button in the submenu. If service was created successfully one will be redirected to new service details page. If something went wrong – a floating error message will appear.

To delete service press "Edit" button in the submenu, then press "Delete" button in the submenu. Service will be deleted and you will be redirected to Multicast services and sources lists

Pressing "Back to List" button in the submenu at any point will return one to Multicast services and sources lists.



All changes must be saved by pressing "Save" button in the submenu beforehand, otherwise they will be lost.