# Gateway SFP+ REST API

(control and statuses description)

## User guide

v1.0

Products : **Gateway emSFP family**

April 18th, 2016

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# 1. Revision History

**Table 1 : Revision History**

| Revision | Author | Date | Changes - DOCUMENT STILL UNDER DEVELOPMENT |
|---|---|---|---|
| D001 | SV | 05/10/2015 | Initial version |
| D002 | SV | 09/11/2015 | Added example for gateway type SFP. |
| D004 | SV | 10/11/2015 | Change representation layout. Added FPGA load in self. Added NAT example. |
| D005 | SV | 07/02/2016 | Revised documentation for 2022-6 |
| D006 | SV | 12/02/16 | Changed table 2.3.1. Added comments on flow difference ENCAP/DECAP Added notes for not implemented resources/field. |
| D007 | SV | 22/02/16 | Added HTTP Requester too example in annexe. |
| D008 | KB | 21/03/16 | Greyed out items that are not yet accessible by the user. |
| D009 | KB | 24/03/16 | Changed formatting |

# 2. References

**Table 2 : References**

| Standard | Org. | Description |
|---|---|---|
| [292] | SMPTE | HD-SDI |
| [INF-8074] | MSA | SFP (Small Form Factor Pluggable) Transceiver |
| [SFF-8472] | MSA | Diagnostic Monitoring Interface for Optical Transceivers |
| [348M] | SMPTE | HD-SDTI |
| [305M] | SMPTE | SDTI |
| [802.3] | IEEE | Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications", IEEE Std 802.3TM-2002, revision of IEEE Std 802.3, 2000 Edition, that is also known as ISO/IEC 8802-3:2000(E) |
| [G.826] | ITU | End-to-end performance parameters and objectives for international, constant bit-rate digital paths and connections |
| RFC-2616 | IETF | Hypertext Transfer Protocol (HTTP) Status Code Registry (HTTP) |
| RFC-4122 | IETF | Universally unique identifier |

# 3. Abbreviation and Acronyms list

**Table 3 : Acronyms**

| Acronym | Description |
|---|---|
| SFP | Small Form Factor |
| MSA | Multi Source Agreement |
| SDI | Serial Digital Interface |
| GE | Gigabit Ethernet |

## 4. Introduction

This document describes many common resources of the API supporting control parameters of various gateway SFPs. It focuses on SMPTE 2022-6 and NAT type modules and will be complemented for other modules later.

## 5. Implementation

Embrionix's API implementation follows the JTNM model resource description (node/device/source/flow).

For some cases, given resource will be optional, since there is no logical representation. If missing resource is queried, then a HTTP 404 "Not Found" code shall be reported.

Data serialization is done based on JSON (JavaScript Object Notation). XML serialization is not supported.
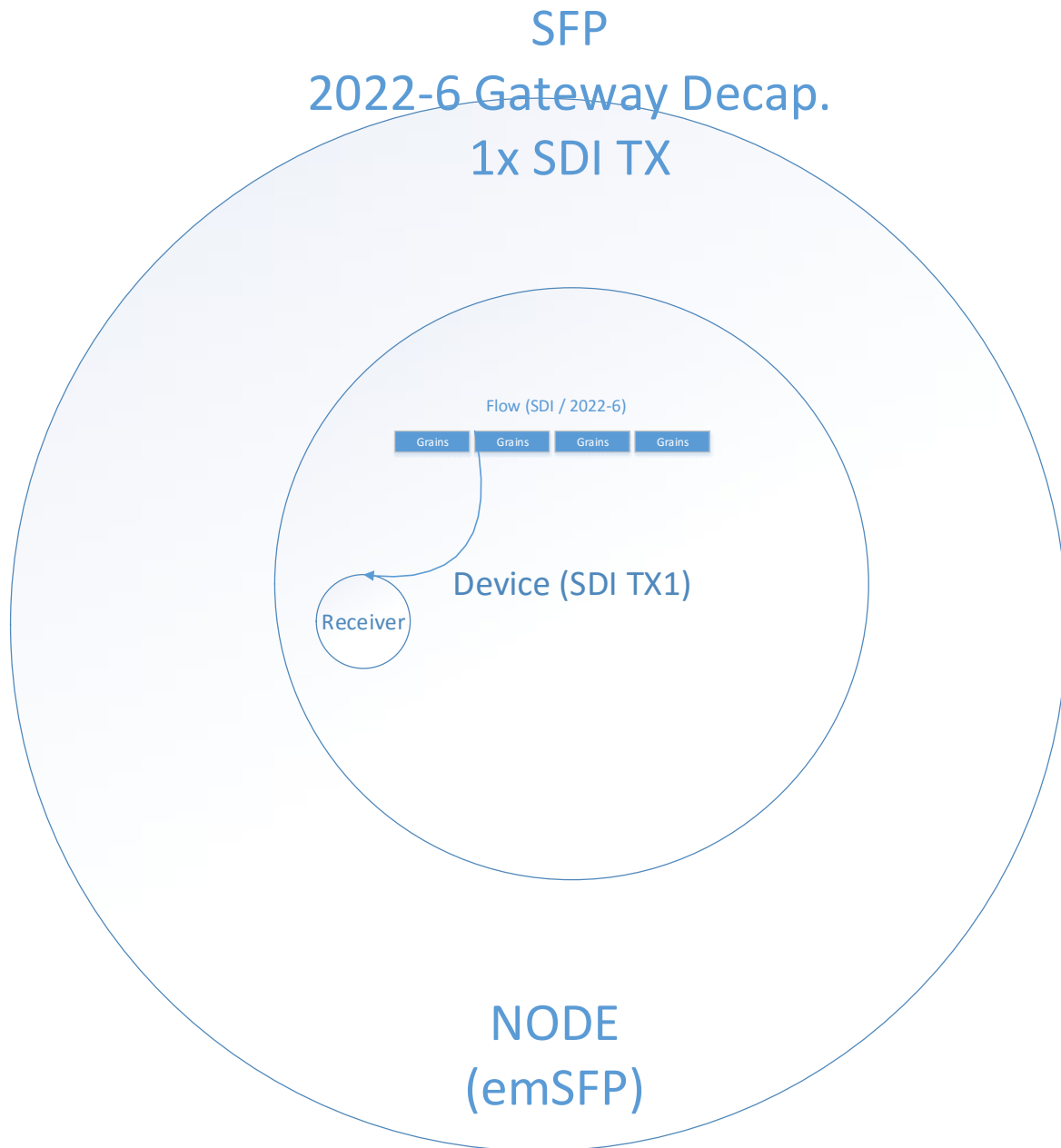
*Limitations*

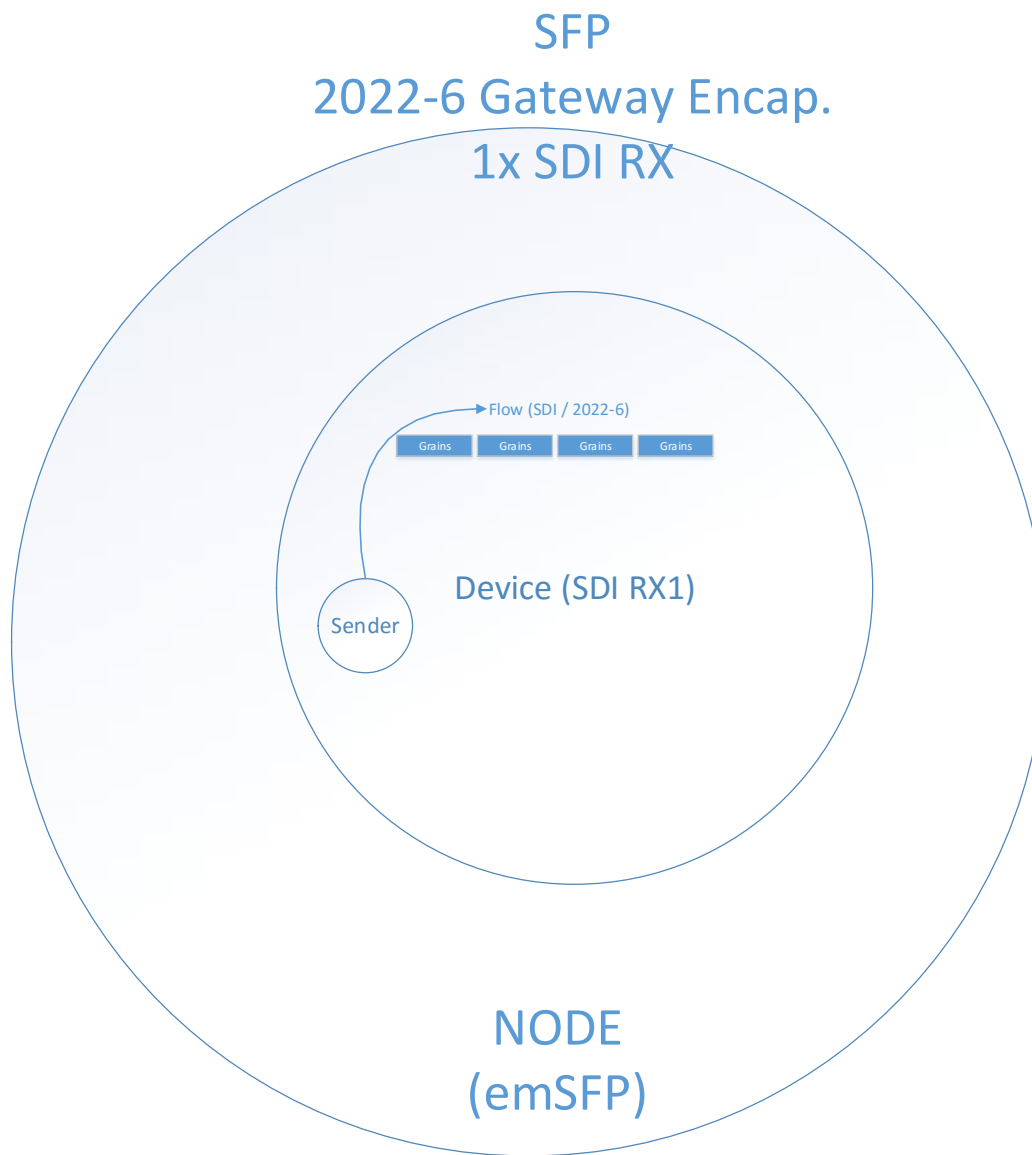Embrionix REST service support only a subset of HTTP methods of such as PUT, GET, POST. Status codes have also been limited to "200 OK", "400 Bad Request" and "404 Not Found".

Redirection is not supported.

## 6. Representation of a emSFP

### a. *2022-6 Gateways*

SFP
2022-6 Gateway Decap.
1x SDI TX

Flow (SDI / 2022-6)

| Grains | Grains | Grains | Grains |

Device (SDI TX1)

Receiver

NODE
(emSFP)

SFP
2022-6 Gateway Encap.
1x SDI RX

Flow (SDI / 2022-6)

| Grains | Grains | Grains | Grains |

Device (SDI RX1)

Sender

NODE
(emSFP)

## 7.  Resources descriptions and methods.

All queries shall be done under via *http://ip_address:port/emsfp/node/vxx/* or *http://emsfp-ax-xx-xx:port/emsfp/node/vxx/* (hostname formed by last 3 bytes of MAC address)

Flow information is SFP-function dependent.

SDI format, SFF and debug information are provisioned and not implemented at this point.

**Table 4 : Resources short table**

| Resource | URI | Description |
|---|---|---|
| node | emsfp/node/v1 | Description: List elements available under for current node. |
|  |  | Get: returns a list of resource in the node. |
|  |  | Put: not supported. |
|  |  | Post: not supported. |
| self | emsfp/node/v1/self | Description: Lists the elements under self. |
|  |  | Get: returns information about this node. |
|  |  | Put: not supported. |
|  |  | Post: not supported. |
| information | emsfp/node/v1/self/information | Description : information on Node component versions |
|  |  | Get: returns information about this resource. |
|  |  | Put: not supported. |
|  |  | Post: not supported. |
| ipconfig | emsfp/node/v1/self/ipconfig | Description: information on node local ip configuration |
|  |  | Get: returns information about this resource. |
|  |  | Put: Modify elements of resource. |
|  |  | Post: not supported. |
| sff | emsfp/node/v1/self/sff | Description: Node's SFF-8472 related information. |
|  |  | Get: not supported. *Will return SFP's A0h, B0h, A2h and B2h information.* |
|  |  | Put: not supported. |
|  |  | Post: not supported. |
| debug | emsfp/node/v1/self/debug | Description: Resource to debug module. |
|  |  | Get: not supported. *Will return information about this resource.* |
|  |  | Put: not supported. |
|  |  | Post: not supported. |
| sources | emsfp /v1/node/sources | Information about the source(s) |
|  |  | Get: not supported. *Will return information about this node.* |
|  |  | Put: not supported. |
|  |  | Post: not supported. |
| flows | emsfp/node/v1 /flows | Information of the flow |
|  |  | Get: returns information about the flows. |
|  |  | Put: writes updated information for the flows. |
|  |  | Post: not supported. |
| senders | emsfp/ v1/node/ senders | Virtual output port. |
|  |  | Get: not supported. *Will return information about this node.* |
|  |  | Put: not supported. |
|  |  | Post: not supported. |
| receivers | emsfp /v1/node/ receivers | Virtual input port. |
|  |  | Get: not supported. *Will return information about this node.* |
|  |  | Put: not supported. |
|  |  | Post: not supported. |

# 8. Resources details and example

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| Resource | example | Description |
|---|---|---|
| Node | [<br>  "self/",<br>  "sources/",<br>  "flows/",<br>  "devices/",<br>  "senders/",<br>  "receivers/"<br>] | List of resources available under Node/Vx/ |

| Resource | example | Description |
|---|---|---|
| self | [<br>  "information/",<br>  "ipconfig/",<br>  "sff/",<br>  "debug/"<br>] | List of resources available under self |

| Resource | example | Description |
|---|---|---|
| self/information | {<br>  "current_version"  : "1234",<br>  "emsfp_version"   : "A101",<br>  "fpag_version"  : "f123", | current_version:  sub module current version |
| | | emsfp_version : Vendor revision of the SFP module |
| | | fpga_version:  Current version of FPGA load. |
| | | type: Current load type. |

| | | |
|---|---|---|
| | "type"        : "1", | fpga_slot_00: Flash slot 00 FPGA load version. |
| | "fpga_slot_00"  : "f120", | fpga_slot_01: Flash slot 01 FPGA load version. |
| | "fpga _slot_01" : "f121", | fpga_slot_02: Flash slot 02 FPGA load version. |
| | "fpga _slot_02" : "f122", | fpga_slot_03: Flash slot 03 FPGA load version. |
| | "fpga_slot_03"  : "f123",<br>"hw_version"    : "A100" | hw_version: Hardware revision. |
| | } | |

| Resource | example | Description |
|---|---|---|
| self/ipconfig | { | version: Current resource version. |
| |     "version"     : "1234", | local_mac:  Device local MAC address.<br>DO NOT MODIFY. |
| |     "local_mac" : "00:01:02:03:04:06",<br>    "ip_addr"        : "192.168.1.2", | ip_addr:  Current device IP address.<br>If DHCP is disabled, device will boot with this ip address.<br>If DHCP is enabled and IP address has been acquired, returns the IP address that has been granted to device. |
| |     "subnet_mask"  : "255.255.255.0", | subnet_mask:  Current device subnet mask.  (see ip_addr) |
| |     "gateway"       : "192.168.1.0", | gateway:  Current device default gateway.  (see ip_addr) |
| |     "hostname" : "emsfp-03-04-05", | hostname: Device hostname.<br>DO NOT MODIFY |
| |     "port"        : "80", | port: Port to access REST API and web page. |
| |     "dhcp_enable"    : "1", | dhcp_enable:  User configurable DHCP flag.<br>Set to 1 to enable, 0 to disable. |
| |     "ctl_vlan_id": "12345", | ctl_vlan_id:  Control plane VLAN number (not implemented yet) |
| |     "ctl_vlan_enable"    : "1", | clt_vlan_enable:  Flag to enable/disable control plane vlan.<br>1 = control plane VLAN enabled.<br>0 = Control plane VLAN disable. |
| |     "data_vlan_id"   : "123", | data_vlan_id:  Data plane VLAN number (not implemented yet) |
| |     "data_vlan_enable"  : "1", | data_vlan_enable:  Flag to enable/disable data plane vlan.<br>1 = data plane VLAN enabled.<br>0 = data plane VLAN disable. |
| |     "bootstatus1"    : "255", | bootstatus1: Current boot status. |
| |     "bootstatus2"    : "255"<br>} | bootstatus2:  Previous boot status. |

| Resource | example | Description |
|---|---|---|

| self/sff | { | a0: comma separated hexadecimal dump of SFP's EEPROM (A0h) |
| |     "a0": "00,01,02,...",<br>    "b0": "00,01,02,...",<br>    "a2": "00,01,02,...",<br>    "b2": "00,01,02,..."<br>} | b0: comma separated hexadecimal dump of SFP's EEPROM (B0h) |
| | | A2: comma separated hexadecimal dump of SFP's digital diagnostic (A2h). |
| | | B2: comma separated hexadecimal dump of SFP's digital diagnostic (B2h). |


| Resource | example | Description |
|---|---|---|
| self/debug | {<br>    "operation" : "read",<br>    "device": "a2",<br>    "register"    : "1234",<br>    "value"      : "1234"<br>} | Reserved for DEBUG PURPOSE ONLY |


| Resource | example | Description |
|---|---|---|
| node/v1/devices | {<br>    "label"        : "2022-6-ecap-01",<br>    "version"     : "1234",<br>    "id"           : "67c25159-ce25-4000-a66c-f31fff890265",<br>    "node_id"    : "3b8be755-08ff-452b-b217-c9151eb21193",<br>    "senders"    : [],<br>    "receivers"   : ["d7aa5a30-681d-4e72-92fb-f0ba0f6f4c3e"]<br>} | label: User defined label (not available yet) |
| | | version: devices register version |
| | | id: device UUID. |
| | | node_id: Node's UUID. |
| | | senders: list of senders UUID available for current device. |
| | | receivers: List of receivers UUID available for current devices. |


| Resource | example | Description |
|---|---|---|
| node/v1/sources | {<br>    "version"  : "1234",<br>    "label"    : "2022-6-ecap-01",<br>    "id"     : "4569cea2-ab63-4f97-8dd1-bad4669ea5e4",<br>    "device_id" : "67c25159-ce25-4000-a66c-f31fff890265"<br>} | label: User defined label (not available yet) |
| | | version: devices register version |
| | | id: source UUID. |
| | | device_id: associated device's UUID. |

| Resource | example | Description |
|---|---|---|
| Node/v1/senders | {<br>  "label"               : "2022-6-ecap-01",<br>  "version"         : "1234",<br>  "id"                  : "d7aa5a30-681d-4e72-92fb-f0ba0f6f4c3e",<br>  "flow_id"         : "b3bb5be7-9fe9-4324-a5bb-4c70e1084448",<br>  "device_id"      : "67c25159-ce25-4000-a66c-f31fff890265"<br>} | label: User defined label (not available yet) |
| | | version: devices register version |
| | | id: sender's UUID. |
| | | flow_id: associated flow's UUID. |
| | | device_id: associated device's UUID. |

| Resource | example | Description |
|---|---|---|
| node/v1/receivers | {<br>  "label"               : "2022-6-ecap-01",<br>  "version"         : "1234",<br>  "id"                  : "d7aa5a30-681d-4e72-92fb-f0ba0f6f4c3e",<br>  "flow_id"         : "b3bb5be7-9fe9-4324-a5bb-4c70e1084448",<br>  "device_id"      : "67c25159-ce25-4000-a66c-f31fff890265"<br>} | label: User defined label (not available yet) |
| | | version: devices register version |
| | | id: receiver's UUID. |
| | | flow_id: associated flow's UUID. |
| | | device_id: associated device's UUID. |

| Resource | example | Description 2022-DECAP FLOW |
|---|---|---|
| node/v1/flows | { | version: current flow version. |
| | "version"           : "1234", | label: User defined label (not available yet) |
| | "label"              : "2022-6-dec-01", | id:  flow's UUID. |
| | "id"             : "b3bb5be7-9fe9-4324-a5bb-4c70e1084448", | source_id: associated source UUID. |
| | "source_id"           : "b3bb5be7-9fe9-4324-a5bb-4c70e1084449", | type:  Flow type.<br>1 = 2022-6 encapsulator.<br>2 = 2022-6 decapsulator. |
| | "type"              : "2", | |
| | "name"              : "chan1", | name: Flow name. |
| | "network":{ | network: IP network related configuration and statuses. |
| |    "src_ip_addr"        : "192.168.1.1", | src_ip_addr: Source IP address. |
| |    "src_udp_port"     : "2000", | src_udp_port:  Source UDP port. |
| |    "dst_ip_addr"       : "192.168.1.2", | dst_ip_addr:  Destination IP address. |
| |    "dst_udp_port"     : "2001", | dst_udp_port:  Destination UDP port. |
| |    "dst_mac"           : "00:01:02:03:04:05", | dst_mac:  Destination MAC address |
| |    "vid_clk_rate"      : "12345678", | vid_clk_rate:  Video clock rate. |
| |    "vlan_tag"           : "1234", | vlan_tag:  Current VLAN tag. |
| |    "ssrc"              : "1234", | Ssrc – Secondary source |
| |    "pkt_filter_src_ip"      : "0", | pkt_filter_src_ip:  Packet filter flag for source IP.<br>1 = Packet will be filtered on source IP address field.<br>0 = Filter disabled. |
| |    "pkt_filter_src_udp"     : "0", | |
| |    "pkt_filter_src_mac"     : "0", | |
| |    "pkt_filter_dst_ip"          : "0", | pkt_filter_src_udp:  Packet filter flag for source UDP.<br>1 = Packet will be filtered on source UDP address field.<br>0 = Filter disabled. |
| |    "pkt_filter_dst_udp"     : "0", | |
| |    "pkt_filter_dst_mac"     : "0", | |
| |    "pkt_filter_vlan"         : "1", | pkt_filter_src_mac: Not implemented. |
| |    "pkt_filter_ssrc"          : "0", | |
| |    "rx_pkt_cnt"      : "12345", | pkt_filter_dst_ip:  Packet filter flag for destination IP.<br>4 = Packet will be filtered on source IP address field.<br>0 = Filter disabled. |
| |    "rx_pkt_good_cnt"   : "12345", | |
| |    "rx_pkt_filtd_cnt"     : "12345" | |
| | }, | pkt_filter_dst_udp:  Packet filter flag for destination UDP.<br>1 = Packet will be filtered on source UDP address field.<br>0 = Filter disabled. |
| | "format_code_valid"      : "1", | |
| | "format_code_t_scan"     : "1", | |
| | "format_code_p_scan"     : "1", | pkt_filter_dst_mac: :  Packet filter flag for destination MAC.<br>1 = Packet will be filtered on for destination MAC address field.<br>0 = Filter disabled. |
| | "format_code_mode"      : "1", | |
| | "format_code_format"    : "1", | |
| | "format_code_rate"       : "123", | pkt_filter_vlan:  Packet filter flag for VLAN tag.<br>1 = Packet will be filtered on VLAN tag field.<br>0 = Filter disabled. |
| | "format_code_sampling" : "1" | |
| | | pkt_filter_ssrc:  Packet filter flag forSSRC.<br>1 = Packet will be filtered on SSRC field.<br>0 = Filter disabled. |

| | | rx_pkt_cnt:  Received packet counter (max = 2^32-1). |
| --- | --- | --- |
| | | rx_pkt_good_cnt:  Valid received packet counter (max = 2^32-1). |
| | | rx_pkt_filtd_cnt:  Number of received packet discarded by the filter (max = 2^32-1) |
| | | format_code_valid:  Flag that indicates if the SDI signal is valid.<br>1 = valid.<br>0 = invalid. |
| | | format_code_t_scan: TBD |
| | | format_code_p_scan: TBD |
| | | format_code_mode: TBD |
| | | format_code_format: TBD |
| | | format_code_rate: TBD |
| | | format_code_sampling:TBD |

| Resource | example | Description 2022-ENCAP FLOW |
|---|---|---|
| node/v1/flows | {<br>    "version"           : "1234",<br>    "label"           : "2022-6-ecap-01",<br>    "id"       : "b3bb5be7-9fe9-4324-a5bb-4c70e1084448",<br>    "source_id"    : "b3bb5be7-9fe9-4324-a5bb-4c70e1084449",<br>    "type"        : "1",<br>    "name"       : "chan1",<br>    "network":{<br>      "src_ip_addr"   : "192.168.1.1",<br>      "src_udp_port"  : "2000",<br>      "dst_ip_addr"   : "192.168.1.2",<br>      "dst_udp_port"  : "2001",<br>      "dst_mac"   : "00:01:02:03:04:05",<br>      "vid_clk_rate"  : "12345678",<br>      "vlan_tag"   : "1234",<br>      "ssrc"   : "12345",<br>      "tx_pkt_cnt"  : "12345"<br>    },<br>    "format_code_valid" : "1",<br>    "format_code_t_scan" : "1",<br>    "format_code_p_scan" : "1",<br>    "format_code_mode" : "1",<br>    "format_code_format" : "1",<br>    "format_code_rate" : "1",<br>    "format_code_sampling" : "1"<br>} | version: current flow version.<br>label: User defined label (not available yet)<br>id: flow's UUID.<br>source_id: associated source UUID.<br>type: Flow type.<br>1 = 2022-6 encapsulator.<br>2 = 2022-6 decapsulator.<br>name: Flow name.<br>network: IP network related configuration and statuses.<br>src_ip_addr: Source IP address.<br>src_udp_port: Source UDP port.<br>dst_ip_addr: Destination IP address.<br>dst_udp_port: Destination UDP port.<br>dst_mac: Destination MAC address<br>vid_clk_rate: Video clock rate.<br>vlan_tag: Current VLAN tag.<br>ssrc: TBD<br>tx_pkt_cnt: Transmitted packet counter (max = 2^32-1). |

## 9. HTTP response descriptions

| Code | Name | Description |
|------|------|-------------|
| 200 | OK 200 | The request has succeeded.  The information returned with the response is dependent of the method used. |
| 400 | 400 Bad request | The request could not be understood due to malformed syntax. |
| 404 | 404 Not found | Not matching request URI. |

## 10.  Annexe  1 – HTTP Requester

*API Example with Firefox HTTP Requester.*
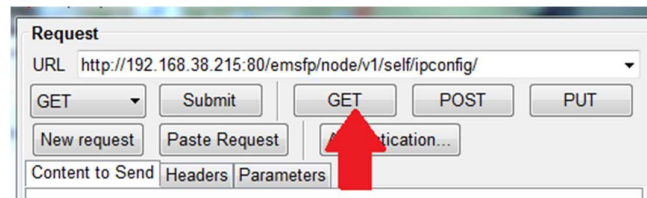
1 – Download Firefox

2 – Download HttpRequester Addon
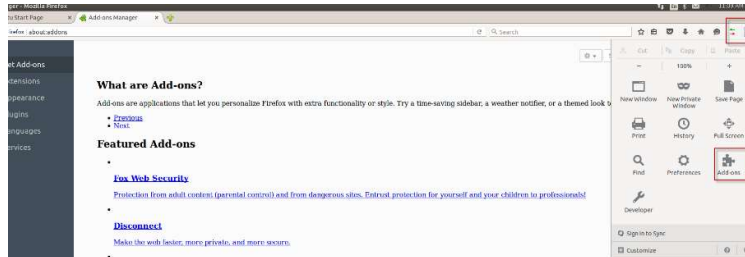


3 – Start HttpRequester Addon
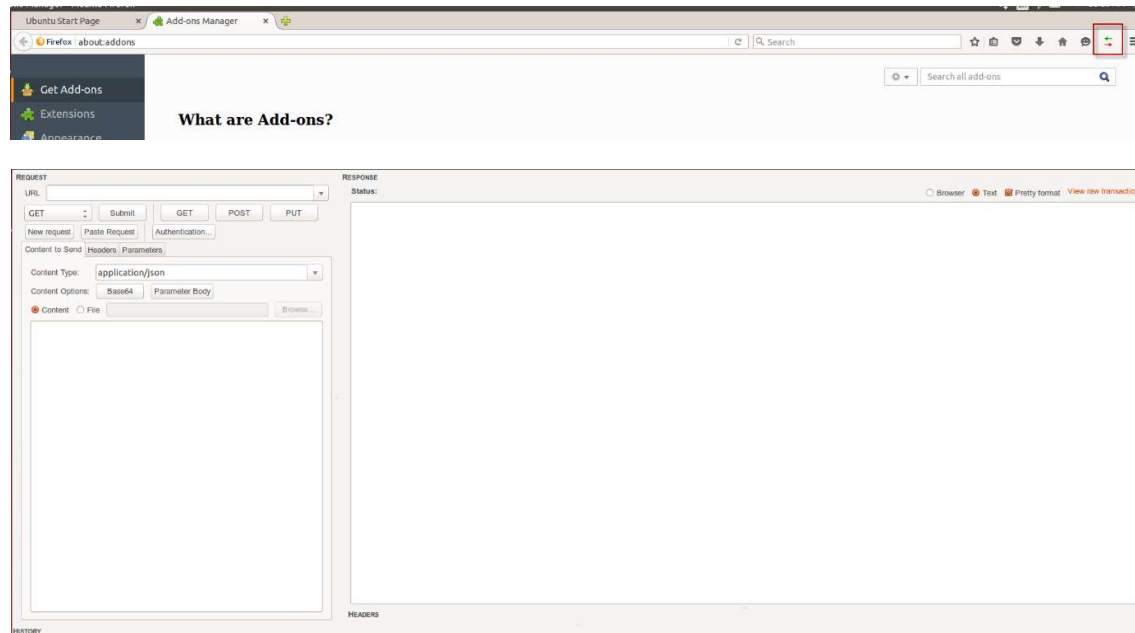


4 – To change video flows information, enter the device flow url in the URL field of HTTP request, "http://<deviceip>:<port>/emsfp/node/v1/flows/" then execute the GET.
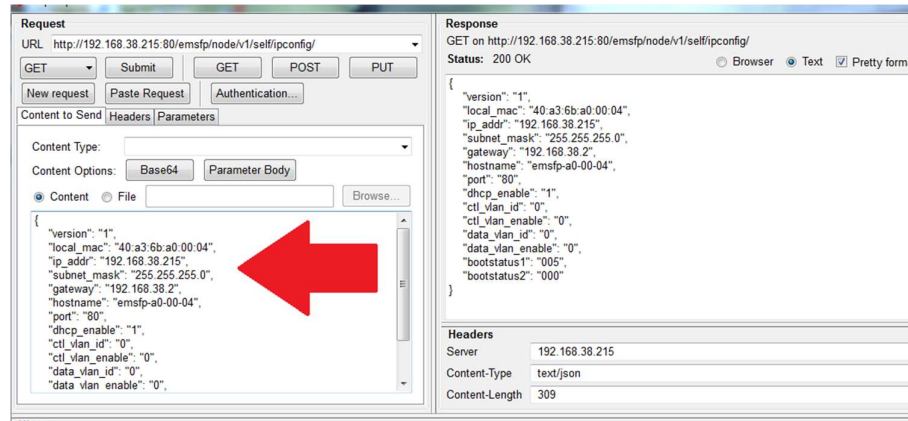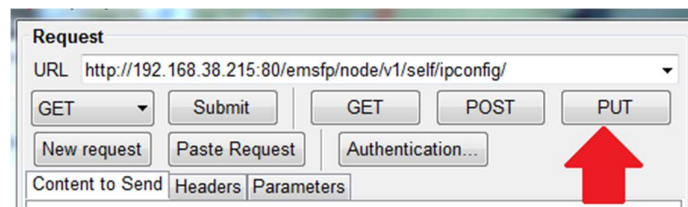
The device should then return the flow in Response field.

5 – To modify the configuration, copy the response string, paste it into the "Content to send" Tab and edit the field you want to change.



Once the change made you can execute a PUT command.



The same process can be done for the device local IP configuration under "http://<deviceip>:<port>/emsfp/node/v1/self/ipconfig"