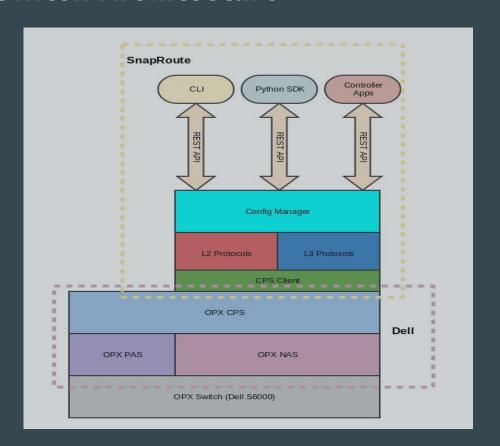
## **OPX-FlexSwitch Demo**

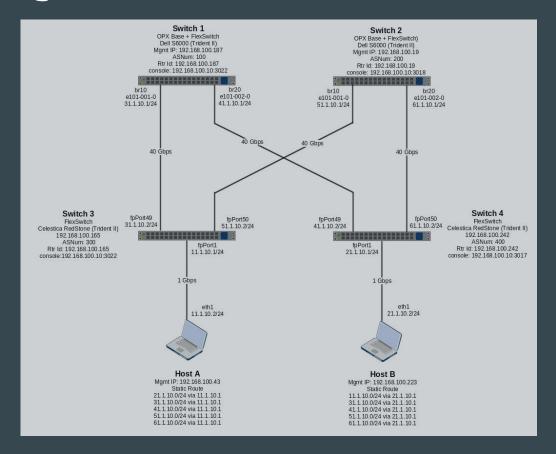
•••

EBGPv4 Demo

#### **OPX + FlexSwitch Architecture**

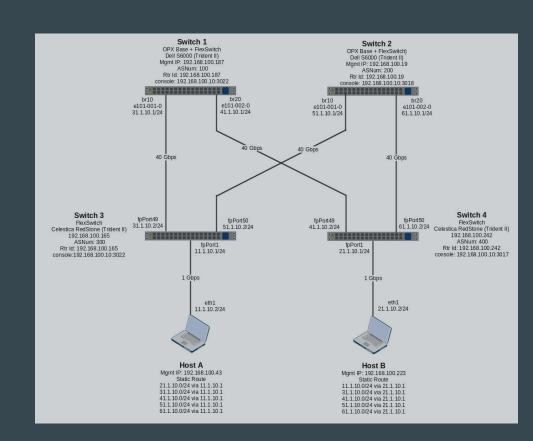


### **Demo Topology**



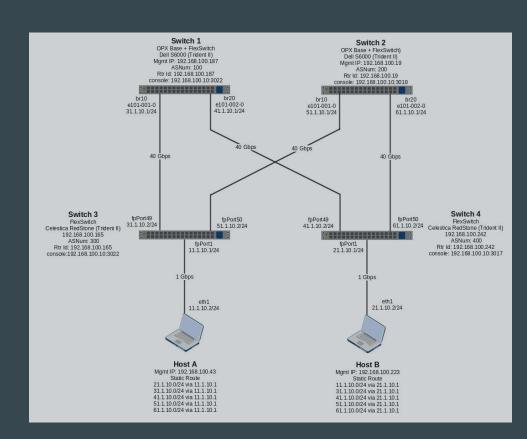
# Switch 1 Configuration (Mgmt Ip: 192.168.100.19)

- **Setting Port:** e101-001-0, AdminState: UP
- Setting Port: e101-002-0, AdminState: UP
- Creating Vlan: 10, Untagged Interface List: [e101-001-0]
- Creating Vlan: 20, Untagged Interface List: [e101-002-0]
- Assigning IPv4 Address 31.1.10.1/24 on br10
- Assigning IPv4 Address 41.1.10.1/24 on br20
- Creating BGP Global Instance LocalAS: 100, RouterId: 192.168.100.187
- Configuring BGPv4 Neighbor Address: 31.1.10.2, PeerAS:
   300, LocalAS: 100
- Configuring BGPv4 Neighbor Address: 41.1.10.2, PeerAS:
   400, LocalAS: 100



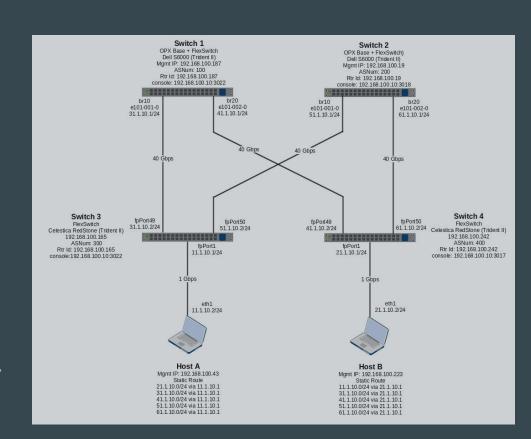
# Switch 2 Configuration (Mgmt Ip: 192.168.100.19)

- **Setting Port:** e101-001-0, AdminState: UP
- Setting Port: e101-002-0, AdminState: UP
- Creating Vlan: 10, Untagged Interface List: [e101-001-0]
- Creating Vlan: 20, Untagged Interface List: [e101-002-0]
- Assigning IPv4 Address 51.1.10.1/24 on br10
- Assigning IPv4 Address 61.1.10.1/24 on br20
- Creating BGP Global Instance LocalAS: 200, RouterId: 192.168.100.19
- Configuring BGPv4 Neighbor Address: 51.1.10.2, PeerAS: 300, LocalAS: 200
- Configuring BGPv4 Neighbor Address: 61.1.10.2, PeerAS:
   400, LocalAS: 200



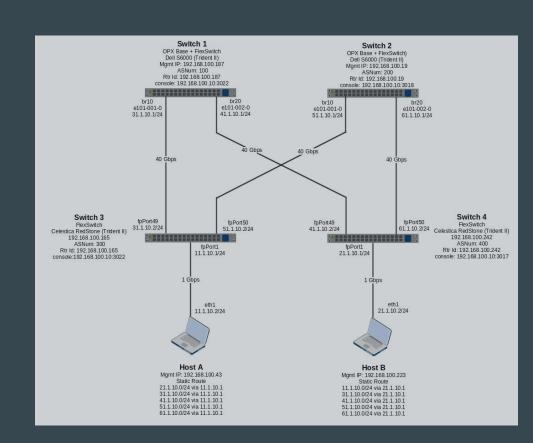
# Switch 3 Configuration (Mgmt Ip: 192.168.100.165)

- **Setting Port:** fpPort49 AdminState: UP, Speed: 40000
- **Setting Port:** fpPort50 AdminState: UP, Speed: 40000
- **Setting Port:** fpPort1 AdminState: UP, Speed: 1000
- Assigning IPv4 Address 31.1.10.2/24 on fpPort49
- Assigning IPv4 Address 51.1.10.2/24 on fpPort50
- Assigning IPv4 Address 11.1.10.1/24 on fpPort1
- **Creating Policy :** Redistribute Connected
- Creating BGP Global Instance LocalAS: 300, RouterId: 192.168.100.165
- Configuring BGPv4 Neighbor Address: 31.1.10.1, PeerAS: 100, LocalAS: 300
- Configuring BGPv4 Neighbor Address: 51.1.10.1, PeerAS: 200, LocalAS: 300



# Switch 4 Configuration (Mgmt Ip: 192.168.100.242)

- **Setting Port:** fpPort49, AdminState: UP, Speed: 40000
- **Setting Port:** fpPort50, AdminState: UP, Speed: 40000
- **Setting Port: f**pPort1, AdminState: UP, Speed: 1000
- Assigning IPv4 Address 41.1.10.2/24 on fpPort49
- Assigning IPv4 Address 61.1.10.2/24 on fpPort50
- Assigning IPv4 Address 21.1.10.1/24 on fpPort1
- **Creating Policy:** Redistribute Connected
- Creating BGP Global Instance LocalAS: 400, RouterId: 192.168.100.242
- Configuring BGPv4 Neighbor Address: 41.1.10.1, PeerAS:
   100, LocalAS: 400
- Configuring BGPv4 Neighbor Address: 61.1.10.1, PeerAS:
   200, LocalAS: 400



### **Example Configuration**

- curl -X PATCH -H "Content-Type: application/json" -d '{"IntfRef": "e101-001-0", "AdminState":"UP"}'
   http://192.168.100.187:8080/public/v1/config/Port
- curl -H "Content-Type: application/json" -d '{"VlanId":10, "UntagIntfList":["e101-001-0"]}'http://192.168.100.187:8080/public/v1/config/Vlan
- curl -H "Content-Type: application/json" -d '{"IpAddr": "31.1.10.1/24", "IntfRef":"br10"}'
   http://192.168.100.187:8080/public/v1/config/IPv4Intf
- curl -H "Content-Type: application/json" -d '{"Vrf":"default", "ASNum":"100", "RouterId":"192.168.100.187"}'
   -X PATCH http://192.168.100.187:8080/public/v1/config/bgpglobal
- curl -H "Content-Type: application/json" -d '{"NeighborAddress":"31.1.10.2", "IntfRef":"", "PeerAS":"300", "LocalAS":"100", "ConnectRetryTime":30, "HoldTime":3, "KeepaliveTime":1}' -X POST http://192.168.100.187:8080/public/v1/config/bgpv4neighbor

## **Port Configuration**

```
* > □ * □ * □ 11:37 PM < □</p>
192.168.100.187:8080/public/v1/config/ports - Google Chrome
       192.168.100.187:80 ×
            C 1 192.168.100.187:8080/public/v1/config/ports
                                                                                                                                                                    Q & O O O :
     顾 Building Linux 🖾 🔯 Linux/drivers/ne - 🎇 Ashutosh Shanke 📕 yuba.stanford.ee - 👭 Welcome to Broa - 🖿 Broadcom - 🗶 Ashutosh Shanke - 🖿 Tomahawk
                                                                                                                                                                       » Dther bookmarks
       MoreExist: false,
       ObjCount: 32,
       CurrentMarker: 0,
       NextMarker: 0,
       Objects: [
              ObjectId: "664b7fb4-7c1d-4dc2-762e-a0e0564d36c5".
                 IntfRef: "e101-001-0",
                 IfIndex: 10,
                 Description: "",
                 PhyIntfType: "",
                 AdminState: "UP",
                 MacAddr: "f4:8e:38:0a:a9:40",
                 Speed: 0,
                 Duplex: "",
Autoneg: "",
                 MediaType: "",
                 Mtu: 0,
                 BreakOutMode: ""
                 LoopbackMode: "",
                 EnableFEC: false,
                 PRBSTxEnable: false,
                 PRBSRxEnable: false,
                 PRBSPolvnomial: ""
              ObjectId: "c16ccda0-7b1c-44cc-4168-30362e0887c6".
             Object: {
                 IntfRef: "e101-002-0".
                 IfIndex: 11,
                 Description: "",
                 PhyIntfType: "",
                 AdminState: "UP",
                 MacAddr: "f4:8e:38:0a:a9:44",
                 Speed: 0,
                 Duplex: "",
                 Autoneg: "",
MediaType: "",
                 Mtu: 0,
                 BreakOutMode: "",
                 LoopbackMode: "",
                 EnableFEC: false,
                 PRBSTxEnable: false,
                 PRBSRxEnable: false,
                 PRBSPolynomial: ""
```

#### **Port State**

```
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192.168.100.187:8080/public/v1/state/ports - Google Chrome
      192.168.100.187:80 ×
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                                                                                                                                                                  » Dther bookmarks
       MoreExist: false,
       ObjCount: 32,
       CurrentMarker: 0,
       NextMarker: 32,
       Objects: [
             ObjectId: "664b7fb4-7cld-4dc2-762e-a0e0564d36c5".
            - Object: {
                 IntfRef: "e101-001-0",
                IfIndex: 10,
                 Name: "e101-001-0",
                 OperState: "UP",
                NumUpEvents: 0,
                 LastUpEventTime: "",
                 NumDownEvents: 0,
                 LastDownEventTime: "",
                 Pvid: 0,
                 IfInOctets: 0,
                 IfInUcastPkts: 0,
                 IfInDiscards: 0.
                IfInErrors: 0,
                 IfInUnknownProtos: 0,
                 IfOutOctets: 0,
                 IfOutUcastPkts: 0.
                 IfOutDiscards: 0.
                 IfOutErrors: 0.
                 IfEtherUnderSizePktCnt: 0.
                 IfEtherOverSizePktCnt: 0,
                 IfEtherFragments: 0,
                 IfEtherCRCAlignError: 0,
                 IfEtherJabber: 0.
                 IfEtherPkts: 0.
                 IfEtherMCPkts: 0,
                 IfEtherBcastPkts: 0,
                 IfEtherPkts640rLessOctets: 0,
                 IfEtherPkts65To127Octets: 0,
                 IfEtherPkts128To2550ctets: 0,
                 IfEtherPkts256To5110ctets: 0,
                 IfEtherPkts512To1023Octets: 0,
                 IfEtherPkts1024To1518Octets: 0,
                 ErrDisableReason: "",
                 PresentInHW: "",
                 ConfigMode: "",
                 PRBSRxErrCnt: 0
              Objected. Halecadan 7614 AA44 A160 202624000746#
```

## Vlan Configuration

```
$ 🔚 😑 🡳 🖪 🖇 🗪 •0) 11:37 PM 😃
192.168.100.187:8080/public/v1/config/vlans - Google Chrome
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                                                                                                                                                             » Dther bookmarks
      MoreExist: false,
      ObjCount: 2,
      CurrentMarker: 0,
      NextMarker: 0,
      Objects: [
             ObjectId: "7e41e1de-8612-4c89-757e-f7ca13fa7412",
           - Object: {
                VlanId: 10,
                AdminState: "UP",
                Description: "none",
                AutoState: "UP",
                IntfList: [ ],
               - UntagIntfList: [
             ObjectId: "de8c287d-ba9f-48d7-6541-d72102cb69ed".
                VlanId: 20,
                AdminState: "UP",
                Description: "none",
                AutoState: "UP",
                IntfList: [ ],
                UntagIntfList: [
                   "e101-002-0"
```

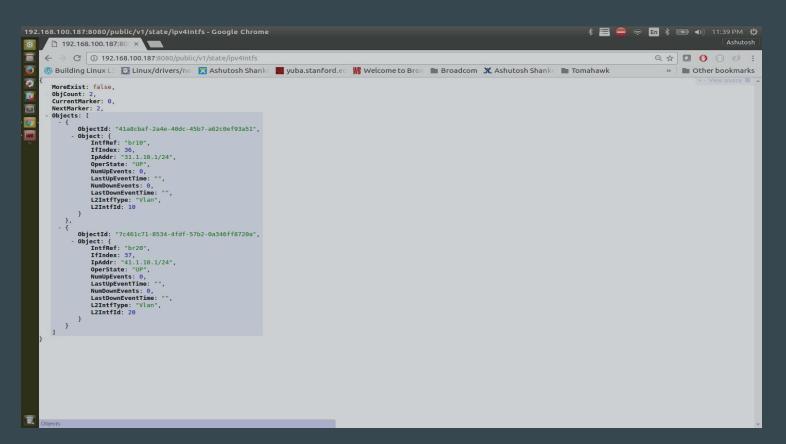
#### Vlan State

```
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192.168.100.187:8080/public/v1/state/vlans - Google Chrome
      192.168.100.187:80 ×
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                                                                                                                                                           » Dther bookmarks
      MoreExist: false,
      ObjCount: 2,
      CurrentMarker: 0,
      NextMarker: 2,
      Objects: [
            ObjectId: "7e41e1de-8612-4c89-757e-f7ca13fa7412",
           - Object: {
               VlanId: 10,
               VlanName: "br10",
               OperState: "UP",
               IfIndex: 36,
               SysInternalDescription: ""
            ObjectId: "de8c287d-ba9f-48d7-6541-d72102cb69ed",
            Object: {
               VlanId: 20,
               VlanName: "br20",
               OperState: "UP",
               IfIndex: 37,
               SysInternalDescription: ""
```

## **IPv4** Interface Configuration

```
192.168.100.187:8080/public/v1/config/ipv4Intfs - Google Chrome
      192.168.100.187:80 ×
        → C ① 192.168.100.187:8080/public/v1/config/ipv4Intfs
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     🔞 Building Linux 🗔 🔯 Linux/drivers/ne 🔀 Ashutosh Shanke 📕 yuba.stanford.ee 🎆 Welcome to Broe 🖿 Broadcom 💥 Ashutosh Shanke 🖿 Tomahawk
                                                                                                                                                              » Dther bookmarks
      MoreExist: false.
      ObjCount: 2,
      CurrentMarker: 0,
      NextMarker: θ,
      Objects: [
            ObjectId: "41a8cbaf-2a4e-40dc-45b7-a62c0ef93a51".
                IntfRef: "br10",
                IpAddr: "31.1.10.1/24",
                AdminState: "UP"
            ObjectId: "7c461c71-8534-4fdf-57b2-0a346ff8720a",
            Object: {
                IntfRef: "br20",
                IpAddr: "41.1.10.1/24",
                AdminState: "UP"
```

#### **IPv4** Interface State



## **BGP Global Configuration**

```
* > □ * □ * □ 11:39 PM ☆
192.168.100.187:8080/public/v1/config/bgpglobals - Google Chrome
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                                                                                                                                                           » Dther bookmarks
      MoreExist: false,
      ObjCount: 1,
      CurrentMarker: 0,
      NextMarker: 0,
      Objects: [
             ObjectId: "c95aed41-da56-412b-7b22-a051112c6232",
           - Object: {
                Vrf: "default",
                ASNum: "100",
                RouterId: "192.168.100.187",
                Disabled: false,
                UseMultiplePaths: false,
                EBGPMaxPaths: 0.
                EBGPAllowMultipleAS: false.
                IBGPMaxPaths: 0,
                DefaultMED: 0.
                Defaultv4Route: false,
                Defaultv6Route: false.
                Redistribution: [ ]
```

#### **BGP Global State**

```
192.168.100.187:80 ×
  → C ① 192.168.100.187:8080/public/v1/state/bgpglobals
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                                                                                                                                               » Dther bookmarks
 MoreExist: false.
 ObjCount: 1,
 CurrentMarker: 0,
 NextMarker: 0,
 Objects: [
       ObjectId: "c95aed41-da56-412b-7b22-a051112c6232".
          Vrf: "default",
          AS: "100",
          RouterId: "192.168.100.187",
          Disabled: false,
          UseMultiplePaths: false,
          EBGPMaxPaths: 0,
          EBGPAllowMultipleAS: false,
          IBGPMaxPaths: 0,
          DefaultMED: 0.
          Defaultv4Route: false.
          Defaultv6Route: false.
          TotalPaths: 0.
          Totalv4Prefixes: 6,
          Totalv6Prefixes: 0
```

## **BGP Neighbor Configuration**

```
192.168.100.187:8080/public/v1/config/bgpv4Neighbors - Google Chrome
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            C 192.168.100.187:8080/public/v1/config/bgpv4Neighbors
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                                                                                                                                                                » Other bookmarks
       MoreExist: false.
       ObjCount: 2,
       CurrentMarker: 0,
       NextMarker: 0,
       Objects: [
             ObjectId: "6501e4aa-fcdd-4755-580c-333f68a66a07".
                NeighborAddress: "31.1.10.2",
                IntfRef: "".
                Description: "",
                 Disabled: false,
                 PeerGroup: "",
                 PeerAS: "300",
                 LocalAS: "100",
                 UpdateSource: "",
                 NextHopSelf: false.
                 AuthPassword: "".
                 RouteReflectorClusterId: 0.
                 RouteReflectorClient: false.
                 MultiHopEnable: false,
                 MultiHopTTL: 0,
                 ConnectRetryTime: 30,
                 HoldTime: 3,
                 KeepaliveTime: 1.
                 AddPathsRx: false.
                 AddPathsMaxTx: 0.
                 BfdEnable: false,
                 BfdSessionParam: "default",
                 MaxPrefixes: 0,
                 MaxPrefixesThresholdPct: 80,
                 MaxPrefixesDisconnect: false.
                 MaxPrefixesRestartTimer: 0,
                 AdjRIBInFilter: "",
                AdjRIBOutFilter: ""
             ObjectId: "b389044f-90b1-42d0-4f22-6beb8a277890",
                NeighborAddress: "41.1.10.2",
                 IntfRef: "",
                Description: "",
                 Disabled: false,
                PeerGroup: "",
                 PeerAS: "400".
                 LocalAS: "100".
                 HadataCource ""
```

### **BGP Neighbor State**

```
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       192.168.100.187:80 ×
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                                                                                                                                                               Q & D O O :
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                                                                                                                                                                  » Other bookmarks
       MoreExist: false.
       ObjCount: 2,
       CurrentMarker: 0,
       NextMarker: 0,
       Objects: [
             ObjectId: "6501e4aa-fcdd-4755-580c-333f68a66a07".
                 NeighborAddress: "31.1.10.2",
                 IntfRef: "".
                 Description: "",
                 Disabled: false,
                 PeerGroup: "",
                 PeerType: 1,
                 SessionState: 6,
                 PeerAS: "300",
                 LocalAS: "100".
                 UpdateSource: "",
                 NextHopSelf: false.
                 AuthPassword: "".
                 RouteReflectorClusterId: 0,
                 RouteReflectorClient: false,
                 MultiHopEnable: false,
                 MultiHopTTL: 0.
                 ConnectRetryTime: 30.
                 HoldTime: 3.
                 KeepaliveTime: 1,
                 AddPathsRx: false,
                 AddPathsMaxTx: 0,
                 BfdNeighborState: "",
                 MaxPrefixes: 0,
                 MaxPrefixesThresholdPct: 80.
                 MaxPrefixesDisconnect: false,
                 MaxPrefixesRestartTimer: 0,
                 TotalPrefixes: 6,
                 AdjRIBInFilter: "",
                 AdjRIBOutFilter: "",
                 Messages:
                  - Sent: {
                       Update: 1,
                       Notification: 1
                    Received: {
                       Update: 2,
                       Notification: 0
```

#### **BGP** Route State

```
$ 🔚 😑 🤝 🖪 $ 🖎 •0) 11:43 PM 😃
192.168.100.187:8080/public/v1/state/bgpv4Routes - Google Chrome
      192.168.100.187:80 ×
        → C ① 192.168.100.187:8080/public/v1/state/bgpv4Routes
                                                                                                                                                          Q & D O O :
     🔞 Building Linux 😂 🔯 Linux/drivers/ne 🔣 Ashutosh Shanke 📕 yuba.stanford.ee 🎆 Welcome to Broadcom 💥 Ashutosh Shanke 🖿 Tomahawk
                                                                                                                                                             » Dther bookmarks
MoreExist: false.
      ObjCount: 6,
       CurrentMarker: 0,
      NextMarker: 0,
       Objects: [
             ObjectId: "",
                Network: "61.1.10.0",
                CIDRLen: 24,
              - Paths: [
                      NextHop: "41.1.10.2",
                      Metric: 0,
                      LocalPref: 0,
                      Path: [
                      PathId: 0.
                      UpdatedTime: "2017-03-23 23:50:43.268568344 +0000 UTC".
                      ValidPath: true.
                      BestPath: true,
                      MultiPath: true,
                      AdditionalPath: false,
                      Origin: "Incomplete",
                      PathType: ""
                      NextHop: "31.1.10.2",
                      Metric: 0,
                      LocalPref: 0,
                     - Path: [
                          "300",
                          "200",
                          "400"
                      PathId: 0,
                      UpdatedTime: "2017-03-23 23:51:02.322062574 +0000 UTC",
                      ValidPath: true.
                      BestPath: false,
                      MultiPath: false,
                      AdditionalPath: false.
                      Origin: "Incomplete",
                      PathType: ""
```

#### **IPv4** Route State

```
192.168.100.187:8080/public/v1/state/ipv4Routes - Google Chrome
       192.168.100.187:80 ×
         → C ① 192.168.100.187;8080/public/v1/state/ipv4Routes
                                                                                                                                                         Q & O O O :
     🔞 Building Linux 🗁 🔯 Linux/drivers/ne 🔣 Ashutosh Shanke 📕 yuba.stanford.ee 🎆 Welcome to Broa 🖿 Broadcom 💥 Ashutosh Shanke 🖿 Tomahawk
                                                                                                                                                            » Other bookmarks
       MoreExist: false.
       ObjCount: 6,
      CurrentMarker: 0,
       NextMarker: 0,
       Objects: [
             ObjectId: "".
                DestinationNw: "61.1.10.0/24",
                Protocol: "EBGP".
                IsNetworkReachable: true,
                RouteCreatedTime: "2017-03-23 23:50:43.282342623 +0000 UTC",
                RouteUpdatedTime: "",
               NextHopList: [
                      NextHopIp: "41.1.10.2",
                      NextHopIntRef: "br20",
                      Weight: 0
                PolicyList: [ ],
                NextBestRoute: {
                   Protocol: "",
                   NextHopList: null
             ObjectId: "",
             Object: {
                DestinationNw: "41.1.10.0/24",
                Protocol: "CONNECTED",
                IsNetworkReachable: true,
                RouteCreatedTime: "2017-03-23 23:50:27.814779493 +0000 UTC",
                RouteUpdatedTime: "",
               NextHopList: [
                      NextHopIp: "0.0.0.0",
                      NextHopIntRef: "br20",
                      Weight: 0
                PolicyList: [],
               NextBestRoute: {
                   Protocol: "".
                   NextHopList: null
```



#### References

- http://www.openswitch.net/
- https://github.com/open-switch
- https://github.com/open-switch/flx-docs
- https://github.com/open-switch/flx-docs/blob/master/README.md
- https://github.com/open-switch/opx-flxl3
- https://github.com/open-switch/opx-flxl2
- <a href="https://github.com/open-switch/opx-flxconfig">https://github.com/open-switch/opx-flxconfig</a>
- <a href="https://github.com/open-switch/opx-flxcps">https://github.com/open-switch/opx-flxcps</a>
- https://github.com/open-switch/flx-docs/blob/master/opx\_flx\_ebgp\_demo.sh
- https://github.com/open-switch/opx-docs

## Q & A



