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**Welcome
To
Network for you
NETCONF & RESTCONF**

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NETCONF:

- NETCONF (**Network Configuration Protocol**) is a protocol developed by IETF (**The Internet Engineering Task Force**) to **“install, manipulate, and delete the configuration of network devices”**.
- NETCONF developed to **manage network devices**.
- The goal of Network Configuration Protocol is to **make network automation easier**.
- **NETCONF uses XML** for data encoding & Remote Procedure Call (RPC) for messages.
- **Simple Network Management Protocol** was also developed by IETF for same purpose.
- **NETCONF & SNMP have many similarities & people referring to NETCONF as SNMPv4**.
- It provides mechanisms to install, manipulate & delete configuration of network devices.
- **YANG describes the data structures exchanged in NETCONF** message like SNMP MIBs.
- NETCONF is based on XML messages exchanged via **SSH protocol using TCP port 830**.
- NETCONF is one of key APIs used by SDN Controller on Southbound to control devices.
- Uses XML-based data encoding for configuration data & protocol messages with YANG.
- It uses simple RPC-based mechanism to facilitate communication between client/server.
- RESTCONF provides subset of NETCONF functionality implemented on top of HTTP/HTTPS.
- Both NETCONF and RESTCONF were developed to manages devices in a standard way.

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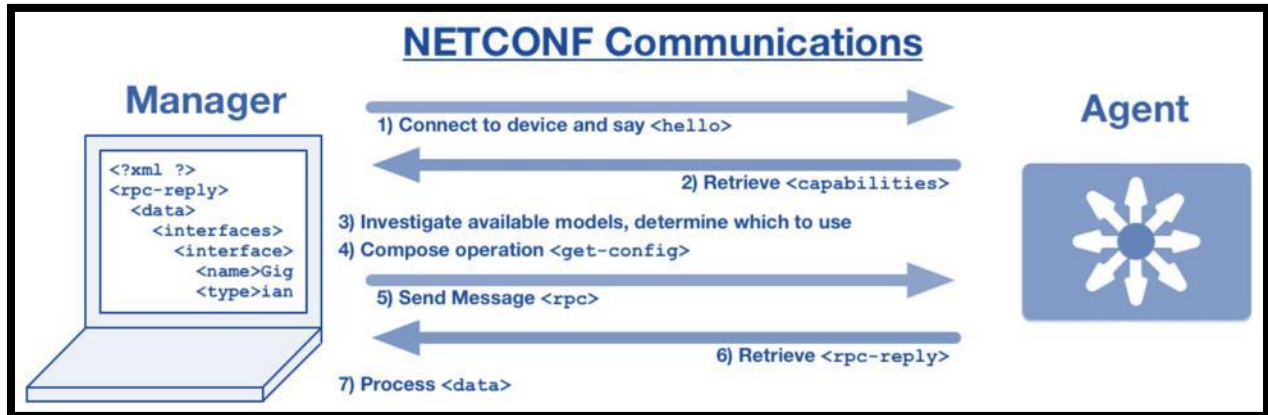
- Network devices running a NETCONF agent can be managed through following list of operations:

Operation	Description
<get>	Retrieve running configuration and device state information.
<get-config>	Retrieve all or part of a specified configuration datastore.
<edit-config>	The <edit-config> operation loads all or part of a specified configuration to the specified target configuration datastore.
<copy-config>	Create or replace an entire configuration datastore with the contents of another complete configuration datastore.
<delete-config>	Delete a configuration datastore. The <running> configuration datastore cannot be deleted.
<commit>	The <commit> operation instructs the device to implement the configuration data contained in the candidate configuration.
<lock>	The <lock> operation allows the client to lock the entire configuration datastore system of a device.
<unlock>	The <unlock> operation is used to release a configuration lock, previously obtained with the <lock> operation.
<close-session>	Request graceful termination of a NETCONF session.



<kill-session>

Force the termination of a NETCONF session.

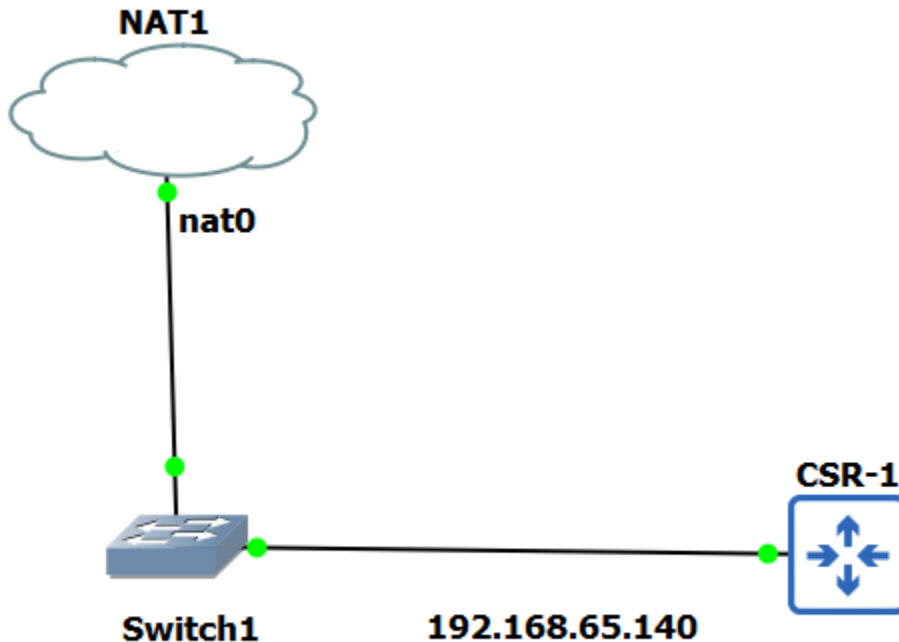


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CSR Router Configuration

```
Router(config)#hostname CSR
CSR(config)#interface gigabitEthernet 1
CSR(config)#ip address dhcp
CSR(config-if)#no shutdown
CSR(config)#username admin privilege 15 password 123
CSR# clock set 10:10:10 1 Jan 2019
CSR(config)#netconf-yang
```

Show Command:

```
CSR#show platform software yang-management process
CSR#show netconf session
```

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RESTCONF:

- Both NETCONF and RESTCONF were developed to manages devices in a standard way.
- RESTCONF is another IETF standard implementing some NETCONF functionality on top.
- **RESTCONF** is just like a NETCONF which is via **HTTP/HTTPS using XML** or JSON messages.
- The RESTCONF API on IOS XE is built from the same models the NETCONF is using.
- RESTCONF is a protocol that provides RESTful APIs over HTTP to access configure.
- It maps YANG specification to RESTful interface & uses HTTPS protocol for transport.
- You can use **JSON or XML as data formats** & it is protocol which works similar to REST API.
- RESTCONF is newer than NETCONF but not replacement & It's more of lightweight option.
- Network devices running RESTCONF agent can be managed through five HTTP operations:

RESTCONF	NETCONF
GET	<get>, <get-config>
POST	<edit-config> (operation="create")
PUT	<edit-config>(operation="create/replace")
PATCH	<edit-config> (operation="merge")
DELETE	<edit-config> (operation="delete")

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Operation	Description
GET	This method retrieves data and metadata for a resource. It is supported for all resource types, except operation resources.
POST	This method creates a data resource or invokes an operations resource.
PUT	This method creates or replaces the target resource.
PATCH	This method partially modifies a resource (the equivalent of the NETCONF merge operation).
DELETE	This method deletes the target resource.

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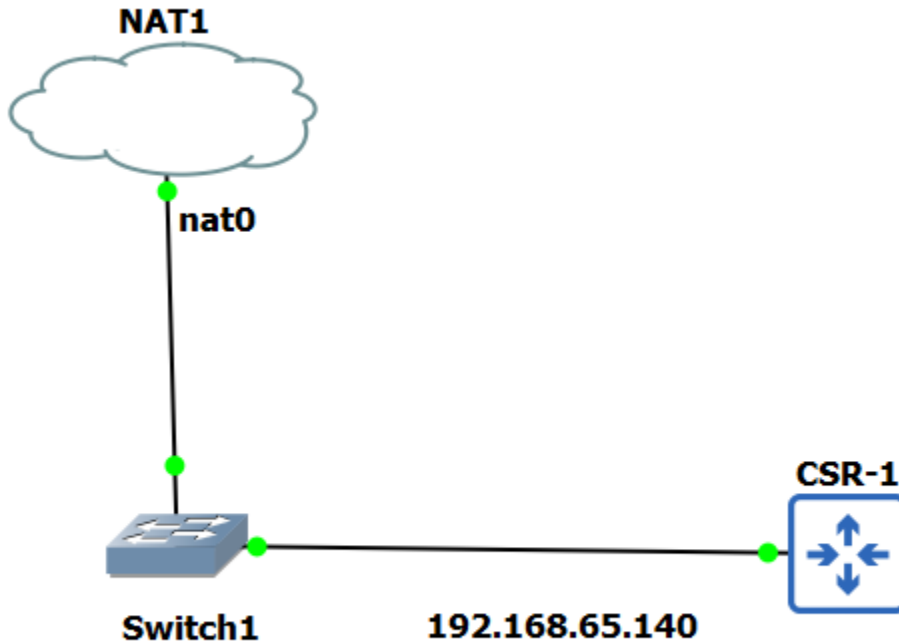
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RESTCONF Lab:



CSR Router Configuration

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Router(config)#hostname CSR
CSR(config)#interface gigabitEthernet 1
CSR(config)#ip address dhcp
CSR(config-if)#no shutdown
CSR(config)#username admin privilege 15 password 123
CSR# clock set 10:10:10 1 Jan 2019
CSR(config)#ip http server
CSR(config)#ip http secure-server
CSR(config)#ip http authentication local
CSR(config)#restconf
```

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Show Command:

CSR#show platform software yang-management process

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