Google gNOI Operation Demo – Using gNOI capabilities to simplify software upgrade use case

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Drivers for a Network Software Upgrade

End Users

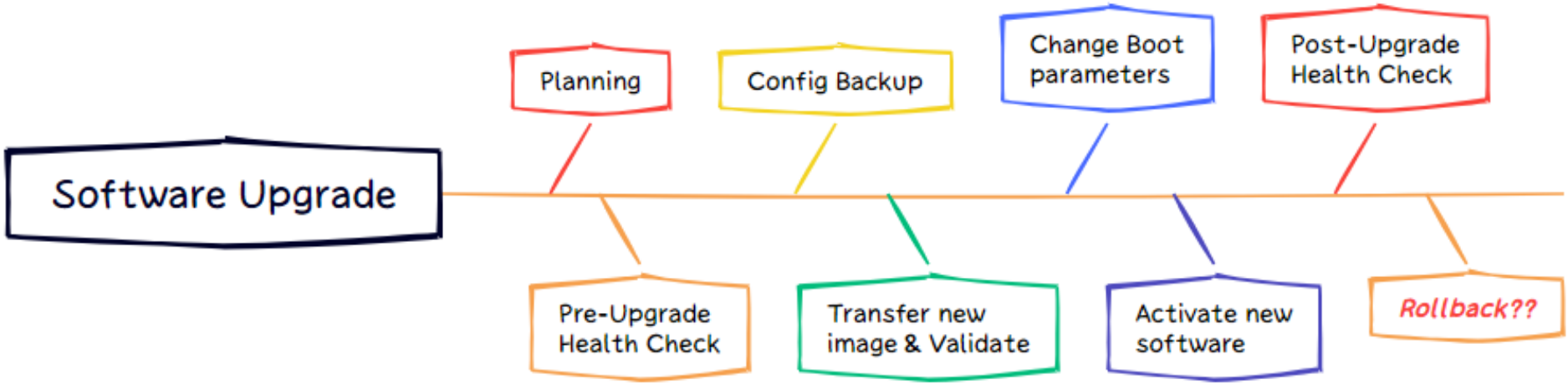
Network Planning, Architecture, Sales

Network Operations

Operations – Checklist for Upgrade

- Testing new software
- Testing external interfaces
- Testing Scripts
- Application/NMS/OSS compatibility
- Developing MOP
- Spares
- MW planning
- Notifying End Users
- Vendor Support

Software Upgrade MOP



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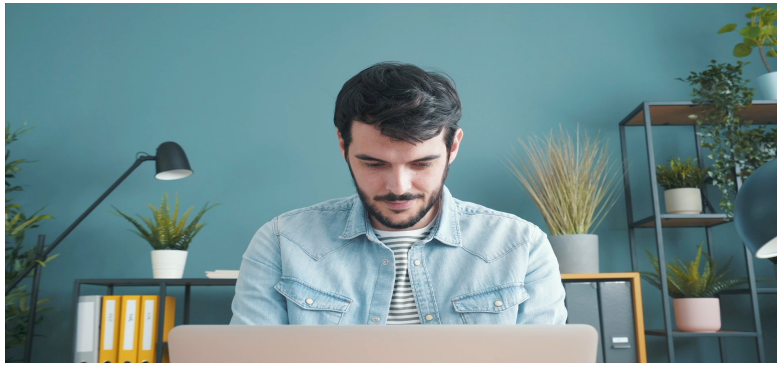
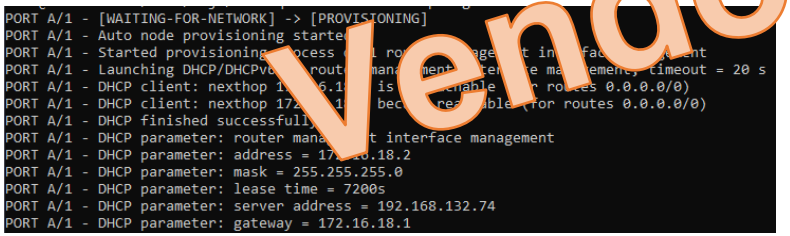
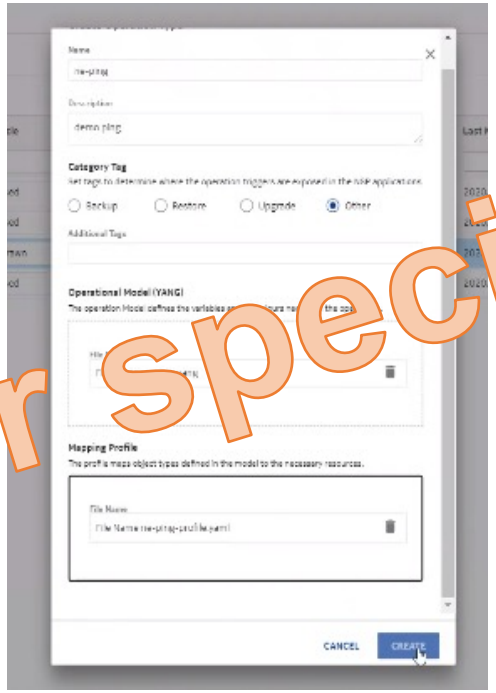
Current Software Upgrade Tools



Manual using CLI



ZTP



Network Management Software

Scripting

Vendor specific

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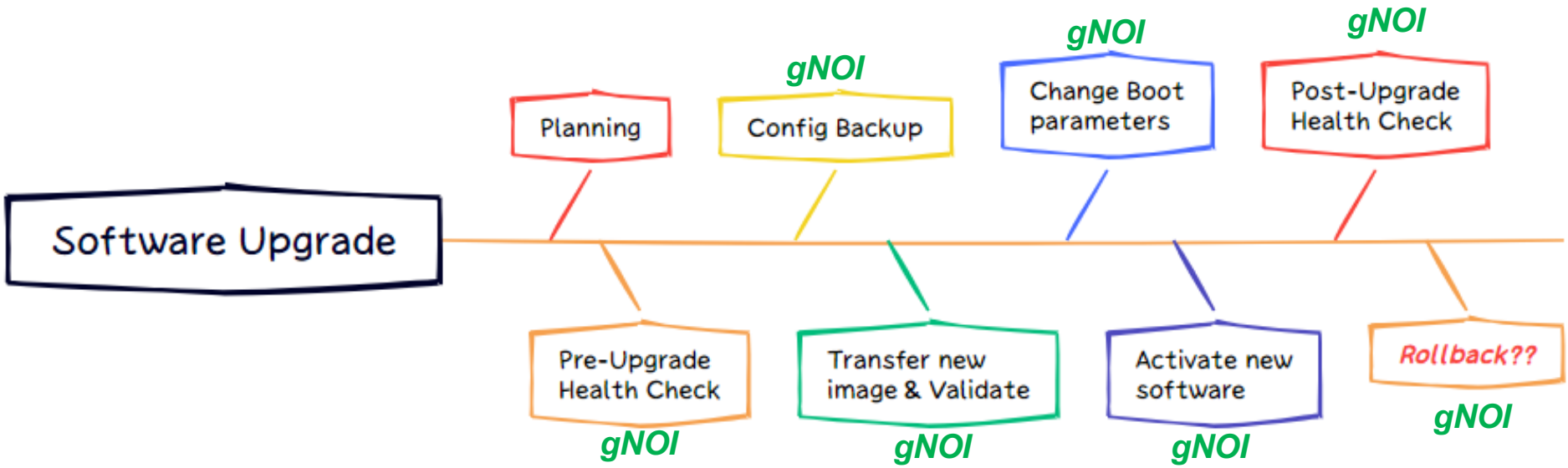
gNOI

- gRPC Network Operations Interface
- gRPC based service for executing operational commands
- Standards defined by OpenConfig - https://github.com/openconfig/gnoi

Software Upgrade MOP



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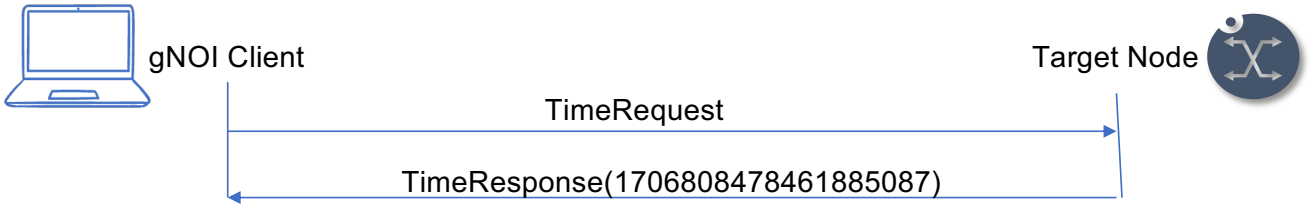
gRPC Introduction

- RPC framework using HTTP 2.0 as underlying transport
- Does not expose HTTP 2.0 to the user (unlike REST)
- Uses a binary payload
- HTTP 2.0 helps with efficient management of connections
- Requires gRPC software on both client and server

How gNOI works?

- Example of using SYSTEM service to get time on target node.



Request

```
> Frame 28: 234 bytes on wire (1872 bits), 234 bytes captured (1872 bits)
> Ethernet II, Src: RealtekU_c8:a1:d3 (52:54:00:c8:a1:d3), Dst: fa:ac:c0:01:04:00 (fa:ac:c0:01:04:00)
> Internet Protocol Version 4, Src: 10.10.10.100, Dst: 10.10.10.104
> Transmission Control Protocol, Src Port: 48834, Dst Port: 57400, Seq: 34, Ack: 64, Len: 168
> HyperText Transfer Protocol 2
> GRPC Message: /gnoi.system.System/Time, Request
```

Response

```
> Frame 30: 301 bytes on wire (2408 bits), 301 bytes captured (2408 bits)
> Ethernet II, Src: fa:ac:c0:01:04:00 (fa:ac:c0:01:04:00), Dst: RealtekU_c8:a1:d3 (52:54:00:c8:a1:d3)
> Internet Protocol Version 4, Src: 10.10.10.104, Dst: 10.10.10.100
> Transmission Control Protocol, Src Port: 57400, Dst Port: 48834, Seq: 64, Ack: 202, Len: 235
> HyperText Transfer Protocol 2
> GRPC Message: /gnoi.system.System/Time, Response
> Protocol Buffers: /gnoi.system.System/Time,response
```

List of current gNOI Services and RPCs

SYSTEM

Ping
Traceroute
Time
SetPackage
SwitchControlProcessor
Reboot
RebootStatus
CancelReboot
KillProcess

FILE

Get
TransferToRemote
Put
Stat
Remove

FACTORYRESET

Start

HEALTHZ

Get
List
Acknowledge
Artifact
Check

OS

Install
Activate
Verify

LINKQUALIFICATION

Create
Get
Capabilities
Delete
List

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gNOI Services - System

- gNOI System service – allows client to perform operational tasks on target node.
- gNOI System RPCs:
  - PING 👍
  - TRACEROUTE
  - REBOOT 👍
  - REBOOTSTATUS 👍
  - CANCELREBOOT 👍
  - SWITCHCONTROLPROCESSOR 👍

👍 **Relevant for software upgrade use case**

gNOI Services - File

- gNOI File service – allows client to transfer files to and from the target node.
- gNOI File RPCs:
  - GET 👍
  - PUT
  - REMOVE
  - STAT 👍

👍 **Relevant for software upgrade use case**

gNOI Services - Healthz

- gNOI Healthz service – allows client to validate the health of target node components.
- gNOI Healthz RPCs:
  - CHECK
  - GET
  - LIST

Status

NAME	NUMBER	DESCRIPTION
STATUS_UNSPECIFIED	0	The path doesn't support healthz
STATUS_HEALTHY	1	The path is healthy
STATUS_UNHEALTHY	2	The path is unhealthy

Relevant for software upgrade use case

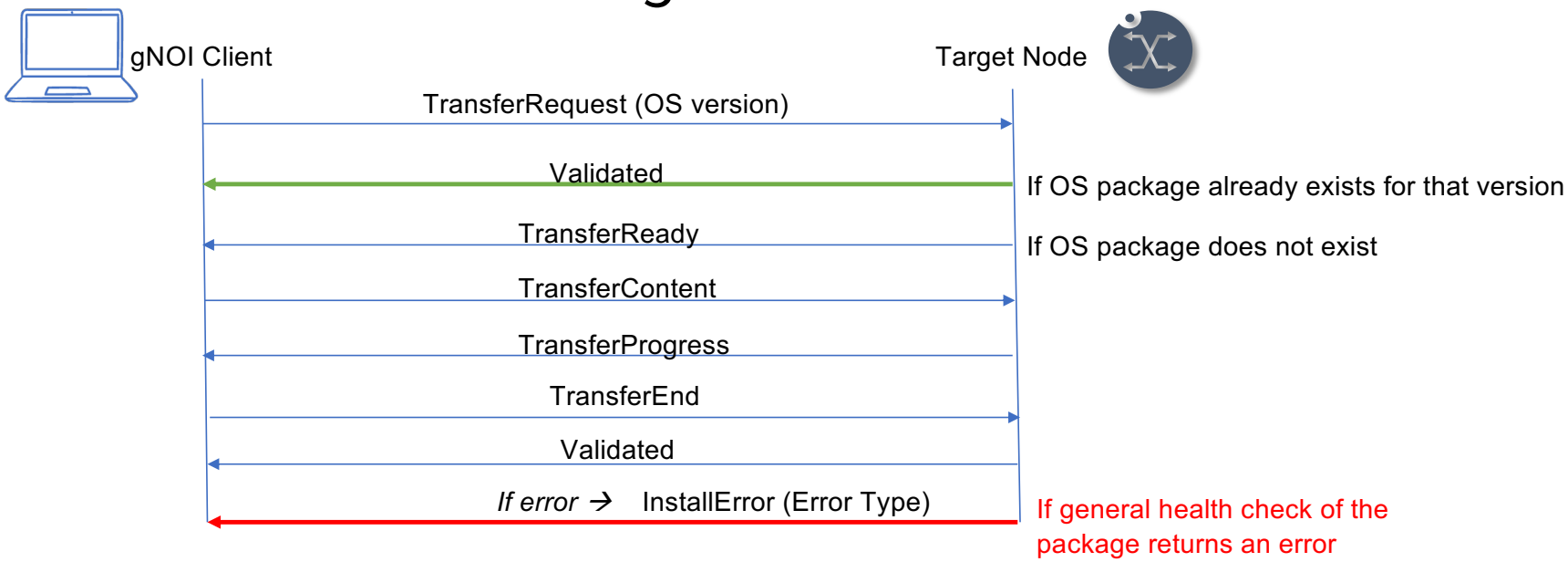
gNOI Services - OS

- gNOI OS service – allows client to install an OS package on a target node.
- gNOI Healthz RPCs:
  - INSTALL 👍
  - ACTIVATE 👍
  - VERIFY 👍

👍 **Relevant for software upgrade use case**

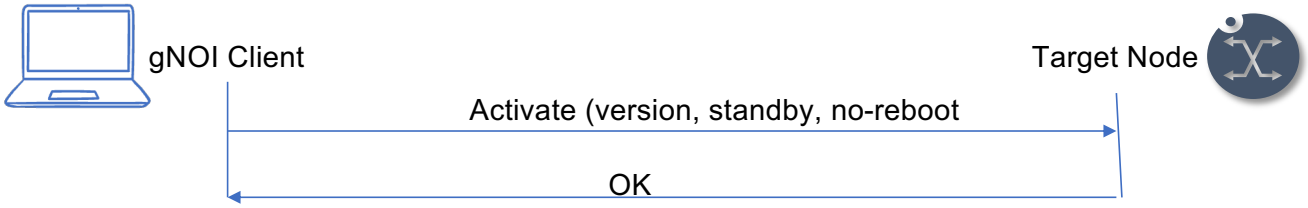
gNOI OS Service – INSTALL RPC

- Transfers the OS package to the target node.
- Bi-directional streaming RPC.



gNOI OS Service – ACTIVATE RPC

- Sets the requested OS version for the target node to use at the next reboot.
- Optional flag to avoid reboot during activation.

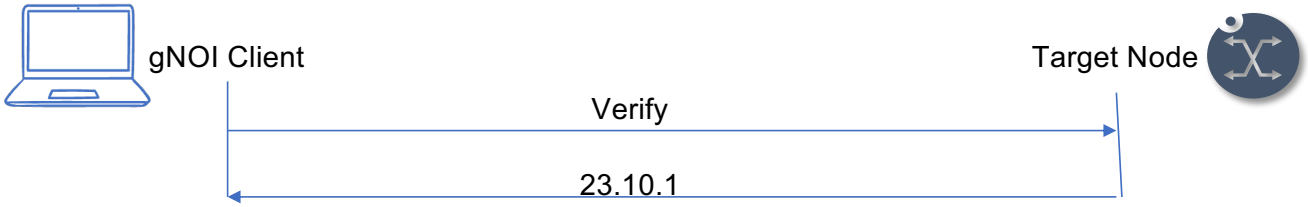


REBOOT RPC (SYSTEM SERVICE)

- If no-reboot flag is used with ACTIVATE RPC, the target node can be rebooted later using the SYSTEM service REBOOT RPC.

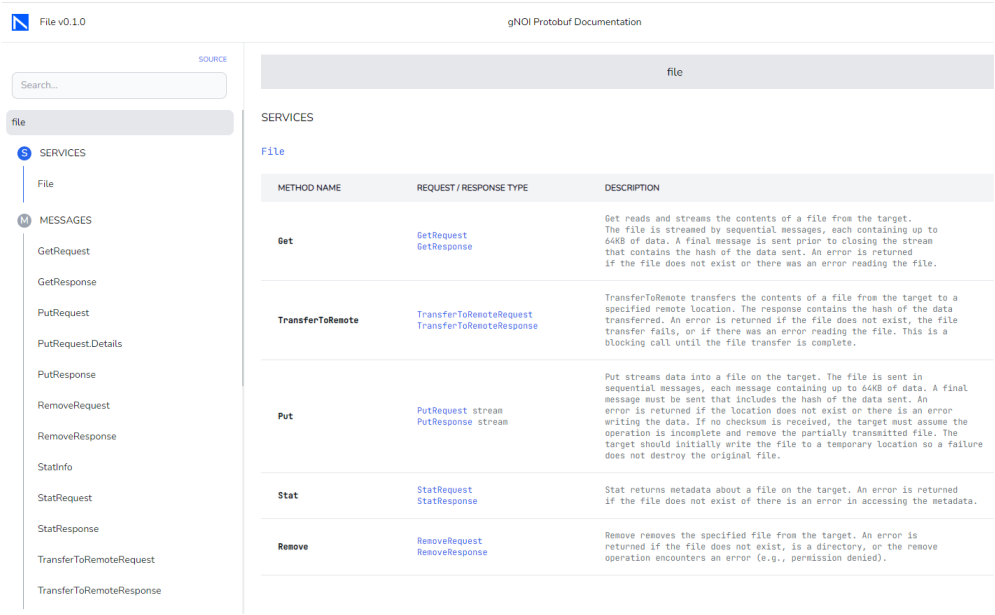
gNOI OS Service – VERIFY RPC

- Checks the OS version running on the target node.



gNOI Client

- gNOIc – gNOI CLI client that provides support for select gNOI services
- https://gnoic.kmrd.dev/
- https://gnxi.srlinux.dev/



DEMO

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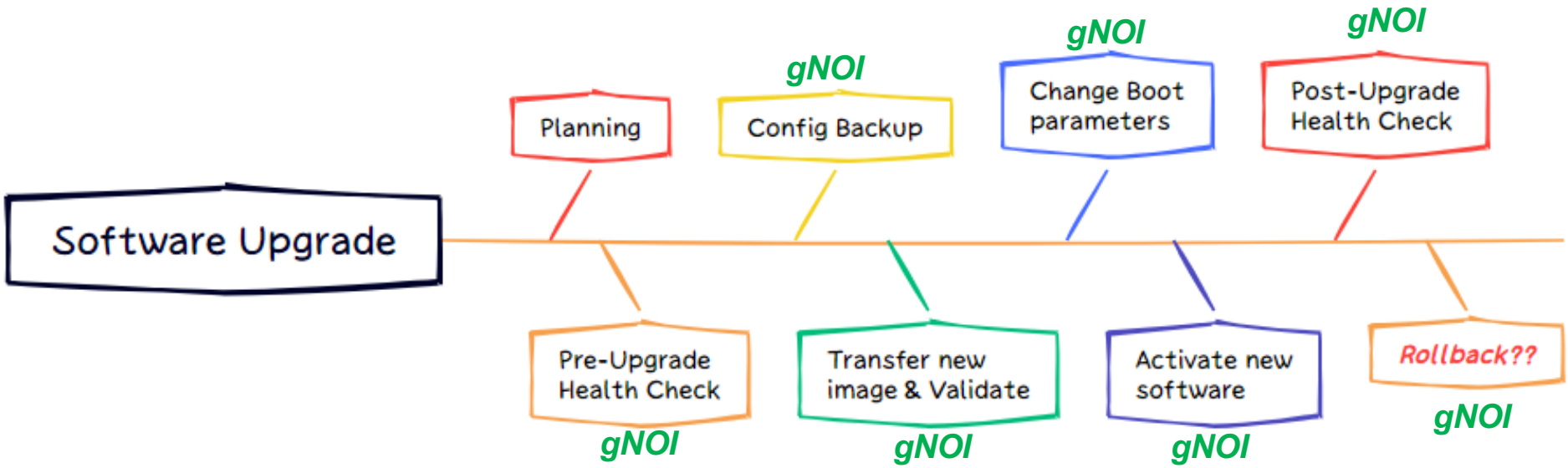
Software Upgrade MOP



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PRE-UPGRADE HEALTH CHECK

```
[root@localhost ~]#
[root@localhost ~]# gnoic --config gnoic.yaml --format json healthz get --path /
platform/fan-tray[id=1]
```

CONFIG BACKUP

```
[root@localhost ~]#
[root@localhost ~]# gnoic --config gnoic.yaml os verify
```

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SOFTWARE TRANSFER

```
[root@localhost ~]#
[root@localhost ~]# gnoic --config gnoic.yaml os install --version srlinux_23.10.1-218
 --pkg /opt/23.10/srlinux-23.10.1-218.bin
```

SOFTWARE ACTIVATE

```
[root@localhost ~]#
[root@localhost ~]#
[root@localhost ~]# gnoic --config gnoic.yaml os verify --format json
```

SOFTWARE VERIFY

```
[root@localhost ~]#
[root@localhost ~]#
[root@localhost ~]# gnoic --config gnoic.yaml os verify --format json
{
  "target": "138.120.180.160:57400",
  "response": {
    "version": "23.7.2-84",
    "verify_standby": {
      "State": {
        "StandbyState": {
          "state": 1
        }
      }
    }
  }
}
[root@localhost ~]# gnoic --config gnoic.yaml os activate --version 23.10.1-218
INFO[0005] target "138.120.180.160:57400" activate response "activate_ok:{}"
[root@localhost ~]#
```

Summary

- Streamline the upgrade process in a multi-vendor network using a standards-based service like gNOI
- gNOI can simplify the software upgrade procedure by automating key steps of the software upgrade MOP.
- The client gNOIc supports gNOI services

Thank you

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