API for Planned Maintenance

Hirotaka Sato / APAN-JP NOC
APAN-JP automation key Goals

Reducing human resource and keep operation quality for daily operation

Key daily operation in APAN-JP NOC

**Routine work**
- Updating AS-Path
- Checking logs (Router, Switches)
- Checking bandwidth
- Changing prefix limit

**Provisioning**
- Receive, analyze new request
- New VLAN to be provisioned
- New BGP to be peered
- Register to the monitoring system

**Trouble Shooting**
- Identifying the issue
- Rerouting traffic
- Configuration change (ex: applying new filters)

**Reporting**
- Trouble notification
- Trouble ticket management
- Writing monthly document
Backbone became complicated never before

- More and more mutual back up is making our network secure.
- It also bring complication.
- Example: APAN-JP Japan to Singapore 100G link
  1. in 2017…
     - JP – HK – SG
  2. In 2018…(APR)
     - JP – HK - SG
  3. In 2019…(more APR)
     - JP – HK – SG
     - JP – SG

X 4 circuits in 2 year!!!
Planned Maintenance handling in APAN-JP

- About 20 maintenance / month.
- APAN-JP connects to 50 NREN or research institution
  - Receiving hundreds of planned maintenance mail per month from NRENS. Only about 20 maintenances are affected to APAN-JP
- APAN-JP is on the top of various NREN circuits.
  - Very confusing and easy to make mistake in the scope
  - Need to make sure the scope by checking interface description
- One router maintenance will make huge impact.

Time to think automation....?
Current planned maintenance notification situation

“NOC as a gateway” to another…?
Last year project: automation in receiving mails!
Automating gets stuck doing alone

- Hard to implement one by one NREN
  - Amount of time to implement automation
  - Amount of time to manual reading them

- Different NREN, different format
  - Elements are different among NRENs

- Maintenance notification mail format may change

- Can’t go well with hand-crafted mails
  - Hand-crafted things are not friend for automating.

Making implementation alone will not solve problem
Giants are starting to change…

NREN A
Ticket System

NREN B
Ticket System

NREN C
Ticket System

Google Network Incident Notification - Reference

Our monitoring systems have detected the following:
BGP peering sessions with AS 7660 are down.

Details:
Google ASN: 15169
Google Neighbor Address(es): 2001:7fa:0:1::ca28:a1
Symptom: BGP prefix limit of 1,000,000

Please investigate and provide an update via this email.
Thank you for peering with Google!
We want robot too!

The gateway does not have to be human…
Proposed standard for Planned Maintenance notification between NRENs
Setting up API server as a subset of Ticket System

Working with Global NOC(IU) for implementation
Candidate Protocol / Technology

- REST API

- Protocols
  - HTTP/1.1 (https)

- Request Parameter
  - Query String (GET)

- Response Format
  - JSON

- Character encoding
  - UTF-8

- Timestamps
  - ISO 8601 format
    - YYYY-MM-DDTHH:MM:SSZ
[{
  "ttid": 4,
  "status": "open",
  "subject": "Sample APAN-JP Maintenance",
  "starttime": "2019-07-17T15:00:00Z",
  "endtime": "2019-07-18T18:00:00Z",
  "description": "APAN-JP will perform their router maintenance.",
  "scope": "Sample Link 1",
  "docid": 6
}]
Demo
Hit the Send button to get a response.
Implementation
Implementation

- Everything in docker image
  - Portability
  - Easier to develop, deploy, rollback
- Python + Flask + MySQL server
  - Quick development
  - Easier to make extension for network automation (Ansible)
- Considering to publish API

Ticket System

REST API (insert)

REST API Server

REST API (GET)

Other NREN
Essential Elements for Maintenance Ticket

- **starttime**
  - Start time of a maintenance in ISO 8601 format
- **endtime**
  - End time of a maintenance in ISO 8601 format
- **subject**
  - Subject of a maintenance
- **scope**
  - Affected scope of a maintenance
- **description**
  - Detail or purpose of maintenance
- **status**
  - Status of maintenance ticket (e.g., open, close)
- **ttid**
  - Ticket number of a ticket
- **docid**
  - Document number of a notification
Summary

• Automation can be used not only network operation but also for daily operation

• I Proposed sample API specification and implementation

• I am looking for collaboration