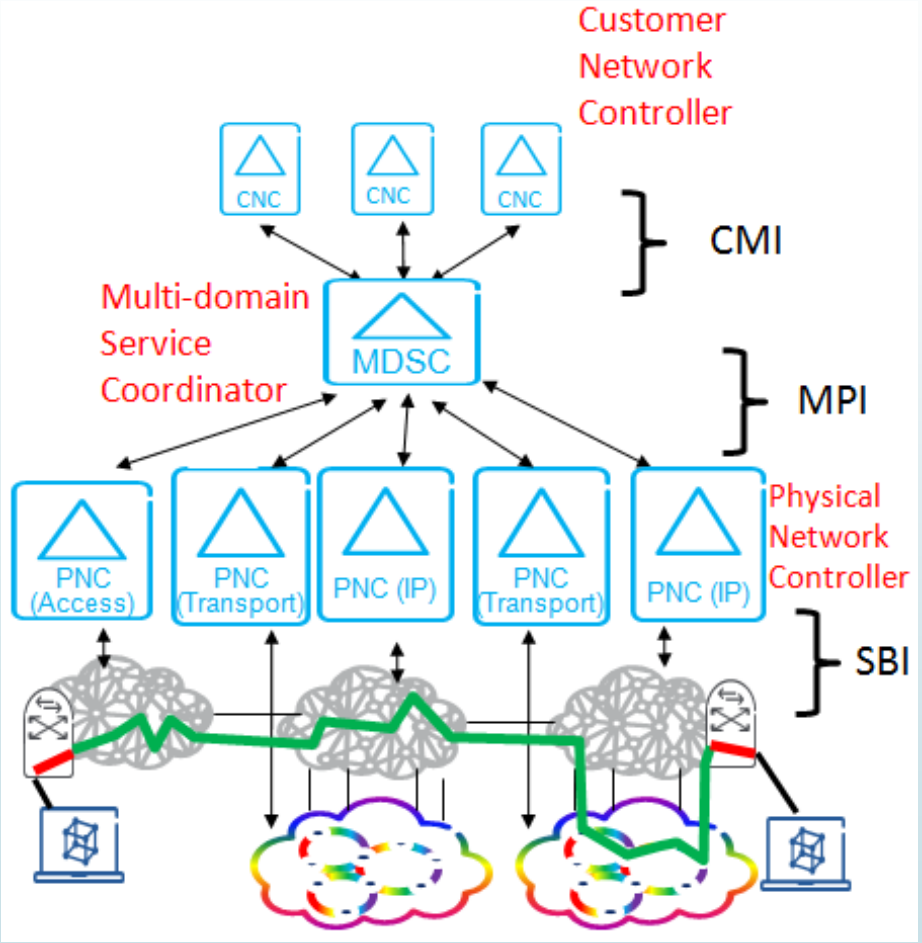
ACTN – Abstraction and Control of TE networks

IETF 96 Hackathon Results

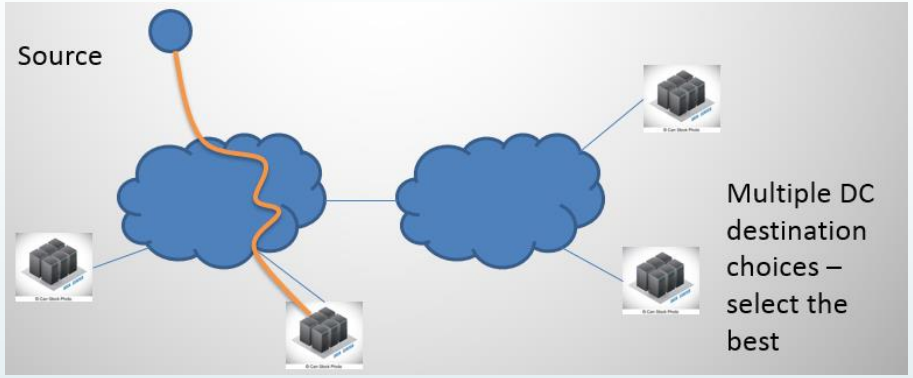
ACTN

- A set of virtual network operations to orchestrate, manage and control of multi-domain heterogeneous TE networks.
- Architecture:
  - draft-ietf-teas-actn-framework
- Protocols:
  - PCEP, BGP-LS, RestConf/Yang
- Four functions in ACTN
  - Multi domain coordination
  - Virtualization/Abstraction
  - Customer mapping
  - Virtual service coordination
- Participation – Jongyoon Shin, Satish, Young Lee, Haomian Zheng, Xin Liu, Wei Wang, Boyuan Yan, Toru Asahina,
- Remote - Avantika



Link: https://www.youtube.com/watch?v=U6e21-nCA4Y

(1) Multi-Destination API



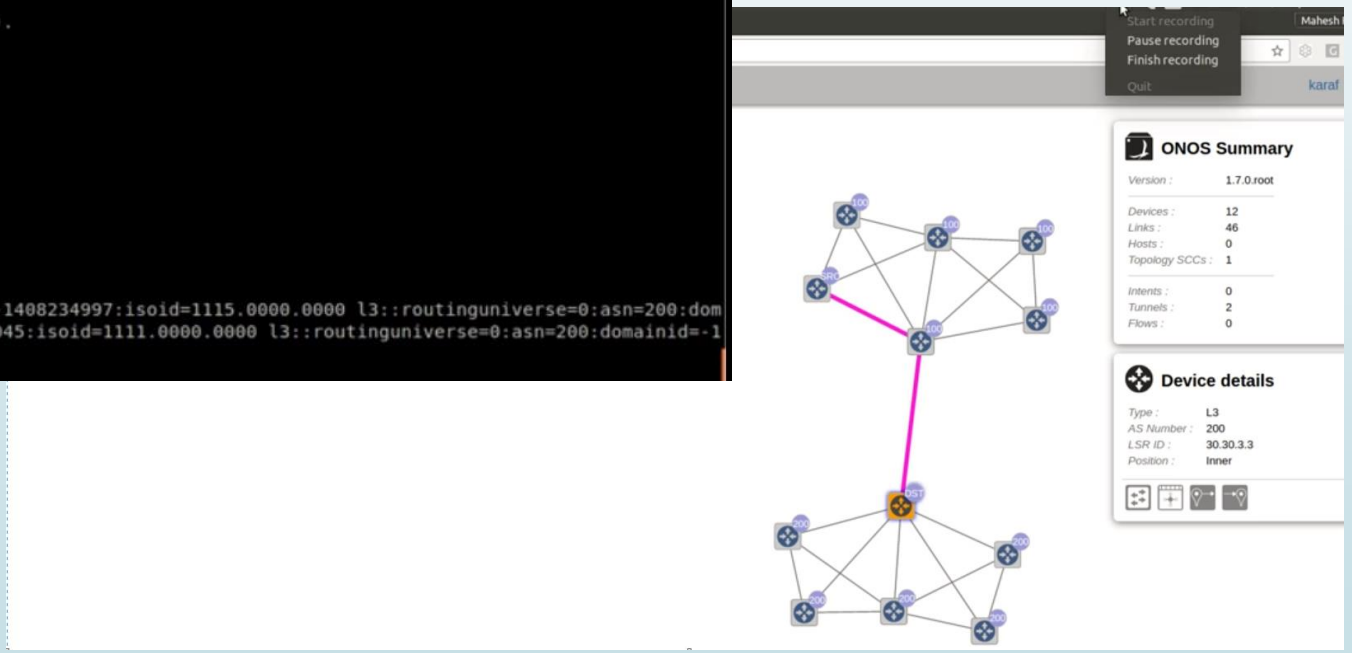
Among a set of endpoints that can meet the customer requirement select the best based on network conditions.

Usecase –

- Select the best DC incase of geographically dispersed DC.
- In case of gaming, pick the best game server.

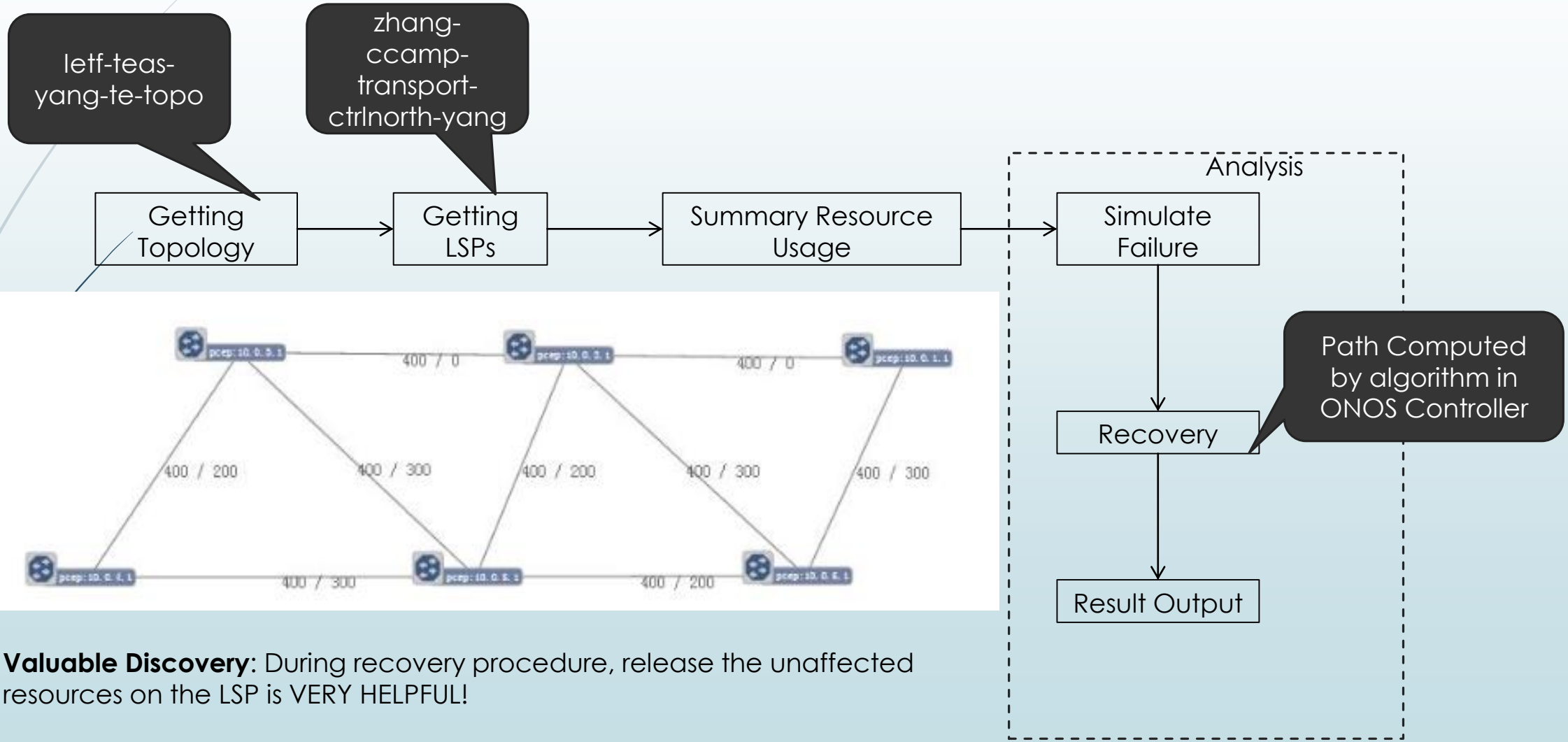
(1) Multi-Destination API

```
onos> vn-compute-optimalpath --help
DESCRIPTION
        onos:vn-compute-optimalpath

        Supports compute optimal path.

SYNTAX
        onos:vn-compute-optimalpath [options] vnName srcPoint dstPoints

ARGUMENTS
        vnName
                virtual network name.
        srcPoint
                Source Point (e.g., L1:device5).
        dstPoints
                Destination Points  (e.g., L3:device1 L3:device2 L3:device3 L3:device4).

OPTIONS
        -j, --json
                Output JSON
        --help
                Display this help message
        -ct, --costType
                The cost attribute IGP cost (1) or TE cost (2).
                (defaults to 2)
        -b, --bandwidth
                The bandwidth attribute of path. Data rate unit is in BPS.

onos> vn-compute-optimalpath -b 1000 -ct 2 vn1 l3::routinguniverse=0:asn=100:domainid=-1408234997:isoid=1115.0000.0000 l3::routinguniverse=0:asn=200:dom
ainid=-1408237045:isoid=1113.0000.0000 l3::routinguniverse=0:asn=200:domainid=-1408237045:isoid=1111.0000.0000 l3::routinguniverse=0:asn=200:domainid=-1
408237045:isoid=1114.0000.0000
```



Link: https://www.youtube.com/watch?v=jY666ksebwk

(2) Survivability Analysis



Valuable Discovery: During recovery procedure, release the unaffected resources on the LSP is VERY HELPFUL!

(2) Survivability Analysis

Broken Link

Broken Service ID

Recovery

S/D Info

Re-Routing Path

Re-Route Result

	A	B	C	D	E	H	I
1	Broken Link	Rerouting Result	Broken Service I	Source Node	estination Noc	Rerouted Path	Service Rerouting Result
2	10.0.6.1 to 10.0.2.1	TRUE	3	10.0.3.1	10.0.6.1	[10.0.3.1 to 10.0.5.1, 10.0.5.1 to 10.0.6.1]	TRUE
3	10.0.3.1 to 10.0.5.1	TRUE	7	10.0.6.1	10.0.3.1	0.6.1 to 10.0.5.1, 10.0.5.1 to 10.0.4.1, 10.0.4.1 to 10.0.	TRUE
4	10.0.5.1 to 10.0.2.1	TRUE	5	10.0.5.1	10.0.1.1	[10.0.5.1 to 10.0.6.1, 10.0.6.1 to 10.0.1.1]	TRUE
5			8	10.0.1.1	10.0.5.1	[10.0.1.1 to 10.0.6.1, 10.0.6.1 to 10.0.5.1]	TRUE
6	10.0.2.1 to 10.0.3.1	TRUE	2	10.0.4.1	10.0.2.1	[10.0.4.1 to 10.0.5.1, 10.0.5.1 to 10.0.2.1]	TRUE
7			3	10.0.3.1	10.0.6.1	[10.0.3.1 to 10.0.5.1, 10.0.5.1 to 10.0.6.1]	TRUE
8			4	10.0.1.1	10.0.3.1	0.1.1 to 10.0.6.1, 10.0.6.1 to 10.0.5.1, 10.0.5.1 to 10.0.	TRUE
9			6	10.0.1.1	10.0.4.1	0.1.1 to 10.0.2.1, 10.0.2.1 to 10.0.5.1, 10.0.5.1 to 10.0.	TRUE
10	10.0.4.1 to 10.0.3.1	TRUE	2	10.0.4.1	10.0.2.1	[10.0.4.1 to 10.0.5.1, 10.0.5.1 to 10.0.2.1]	TRUE
11			6	10.0.1.1	10.0.4.1	0.1.1 to 10.0.6.1, 10.0.6.1 to 10.0.5.1, 10.0.5.1 to 10.0.	TRUE
12	10.0.5.1 to 10.0.4.1	TRUE	1	10.0.4.1	10.0.1.1	.0.3.1, 10.0.3.1 to 10.0.5.1, 10.0.5.1 to 10.0.6.1, 10.0.6	TRUE
13	10.0.2.1 to 10.0.1.1	FALSE	4	10.0.1.1	10.0.3.1	0.1.1 to 10.0.6.1, 10.0.6.1 to 10.0.5.1, 10.0.5.1 to 10.0.	TRUE
14			5	10.0.5.1	10.0.1.1	[10.0.5.1 to 10.0.6.1, 10.0.6.1 to 10.0.1.1]	TRUE
15			6	10.0.1.1	10.0.4.1	.0.6.1, 10.0.6.1 to 10.0.2.1, 10.0.2.1 to 10.0.5.1, 10.0.5	TRUE
16			8	10.0.1.1	10.0.5.1	[]	FALSE
17	10.0.6.1 to 10.0.1.1	FALSE	1	10.0.4.1	10.0.1.1	[]	FALSE
18	10.0.6.1 to 10.0.5.1	TRUE	1	10.0.4.1	10.0.1.1	.0.5.1, 10.0.5.1 to 10.0.2.1, 10.0.2.1 to 10.0.6.1, 10.0.6	TRUE
19			7	10.0.6.1	10.0.3.1	0.6.1 to 10.0.2.1, 10.0.2.1 to 10.0.5.1, 10.0.5.1 to 10.0.	TRUE
20							

Further Discussions

Inter-Layer

Packet – Optical integrations

- Implementation to support inter-layer
- How to handle inter-layer links
- Various modes

Abstraction

Multi domain multi layer abstracted topology

- Algorithm Considerations
- Representation and encodings

Ask us for a demo during the IETF week….

Thanks!