IETF87 report　ISOC-JP IETF報告会

Routing-Area : 新たなアーキテクチャ可能性を中心に

5 Sept. 2013

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Agenda

- *Status BoF*
- NSC BoF
- Other WGs
  - SDNRG
  - NVO3WG
  - I2RSWG

Status BoF ?!

- Stacked Tunnels for Source Routing
  - IPに、Source Routingの概念は昔からあったが、使われて来なかった
  - Source Routingのためには、MPLS TEが使われていた
  - しかしここにきて、複数のベンダから、Source Routingに関する提案があった

    http://datatracker.ietf.org/doc/draft-gredler-rtgwg-igp-label-advertisement (Juniper)

    http://datatracker.ietf.org/doc/draft-previdi-filsfils-isis-segment-routing (Cisco)

    (基本的な考え)

    - IGPで”Label”(今まで、LDPやRSVPといったプロトコルを使っていた)を配布する
    - ”Label”のStackingで、Source Routingを表現する

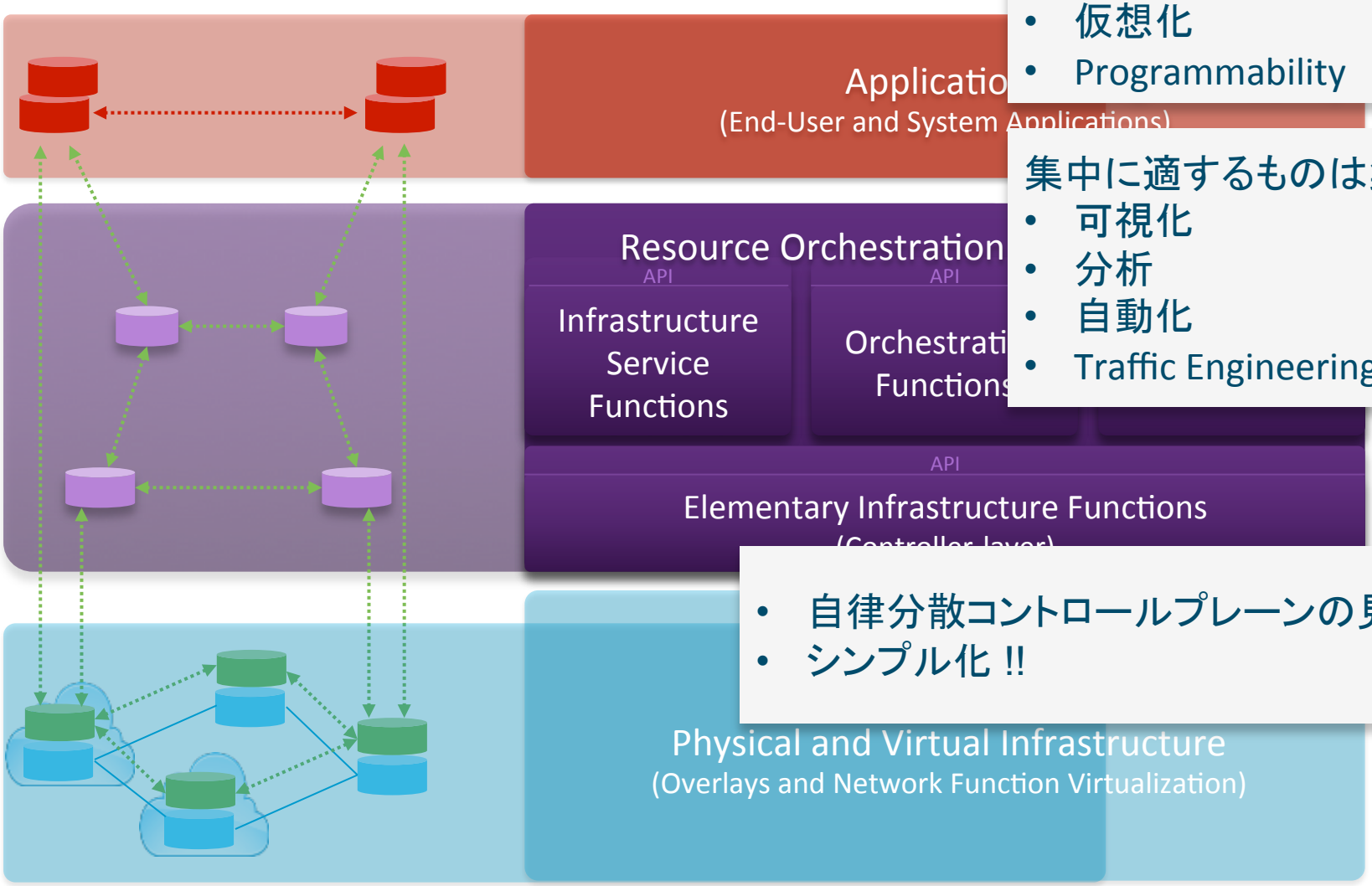
    (裏情報)

    BoFを呼びかけたのはJuniper。Ciscoは粛々と進めようとしていた。。

Status BoF ?!

- BoFの目的
  - 下記の問いについて答えを出すこと
    - 今、Source Routingについて議論するときなのか？
    - その場合、IETFとしては、どう扱うべきか？
- 具体的には
  - Use caseはあるのか。あるとしたらどんな?
  - どのくらいData planeの選択肢が必要か。MPLS? IPv4? IPv6?
  - 現行Data planeの安定性についてはどう考えるか
  - どのような、Management/Control Architectureが必要になるか
  - “Label”は何を表すか
  - …

SDN – Architectural Model



- 抽象化
- 仮想化
- Programmability

集中に適するものは集中

- 可視化
- 分析
- 自動化
- Traffic Engineering

- 自律分散コントロールプレーンの見直し
- シンプル化 !!

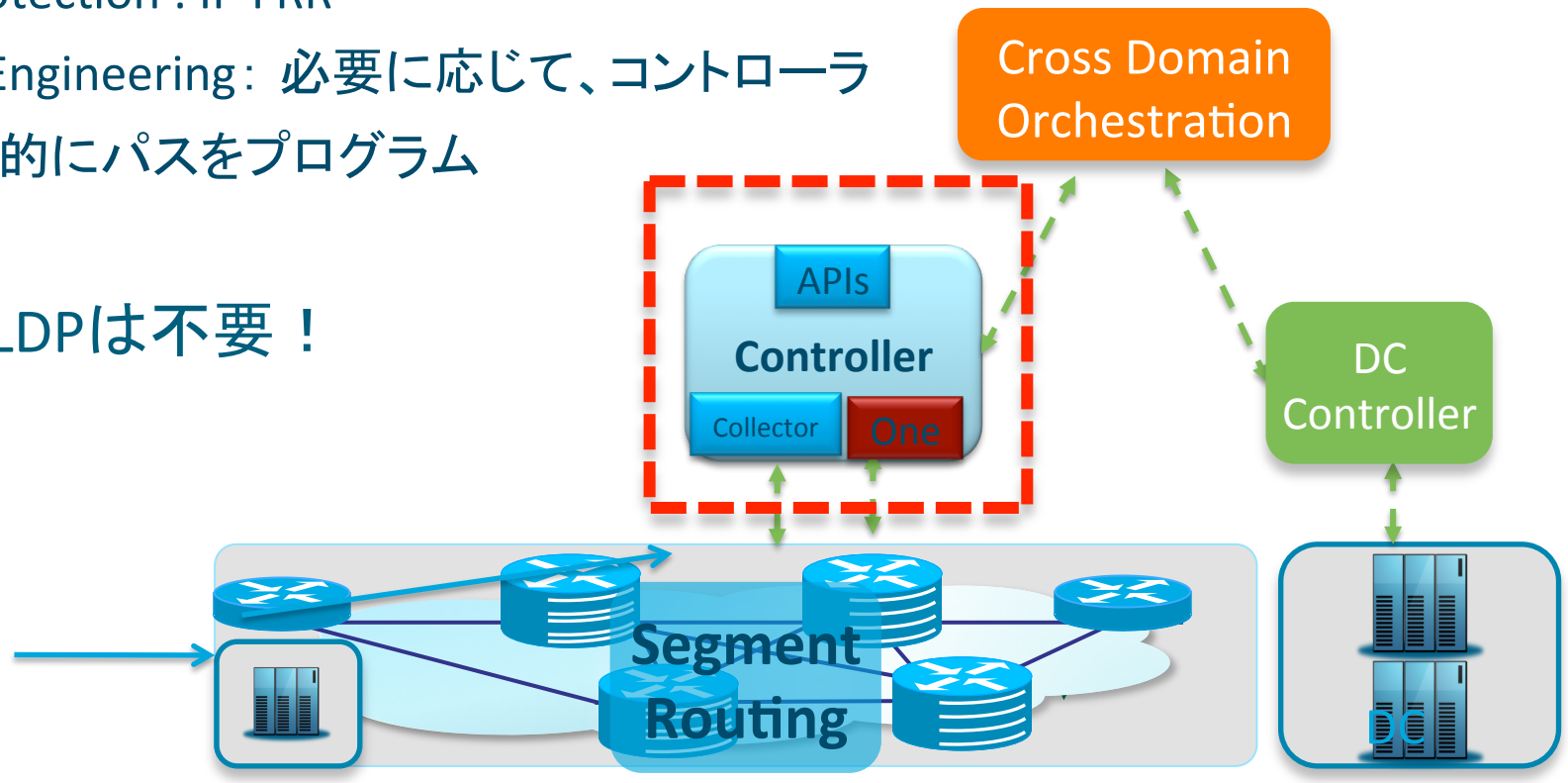
Segment Routing(*)によるNWのシンプル化

Network Control Planeの見直し

- IGPにより、Segment ID(Node, Adj)を配布
- Fast Protection : IP FRR
- Traffic Engineering : 必要に応じて、コントローラから明示的にパスをプログラム

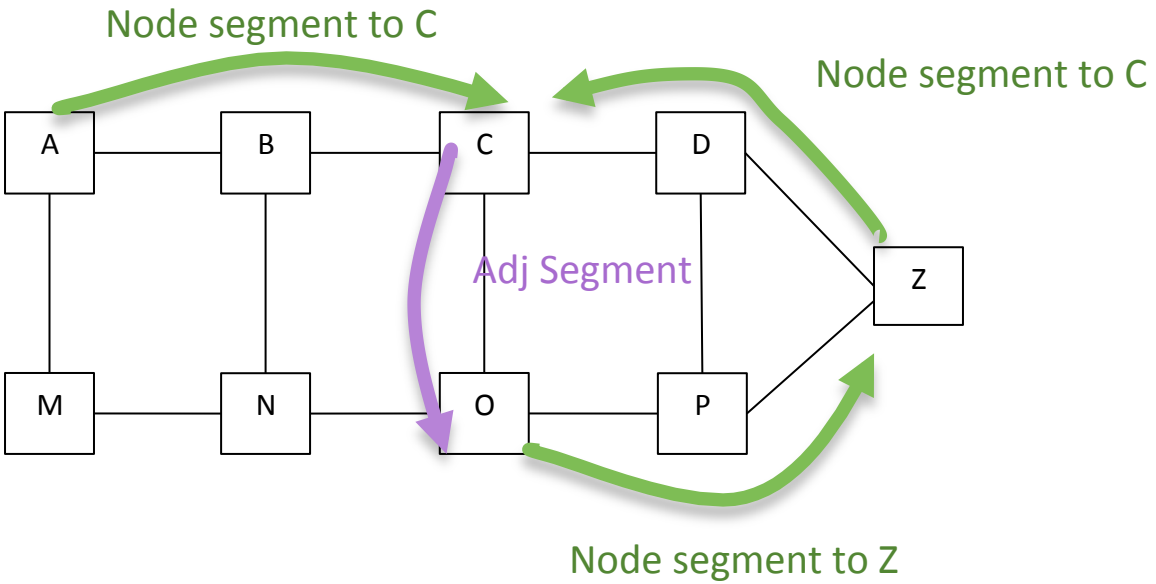
↓

RSVP, LDPは不要！

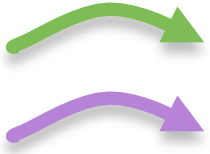


(*) draft-filsfils-rtgwg-segment-routing-00

Segment Routing – 基本動作

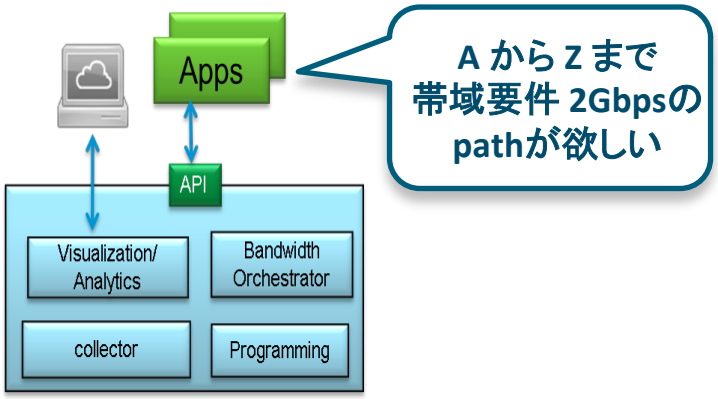


- ネットワークを”Segment”として表現する。
- 2種類のSegment：
  - Node Segment: 該当ノードへのshortest-path
  - Adjacency Segment: 隣接ノードとのone-hop path



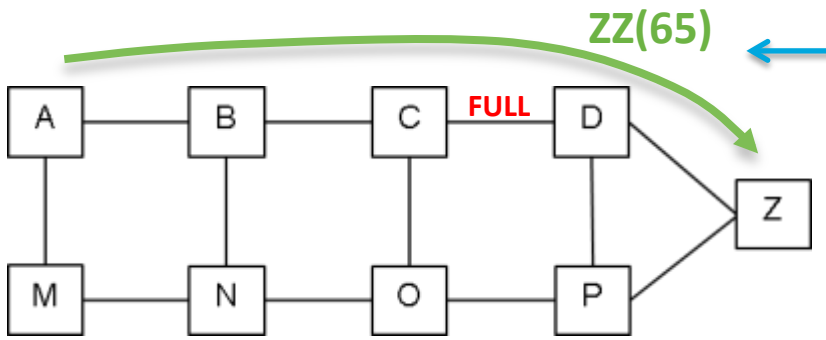
- IGP(ISIS/OSPF)により、”segment ID”を広報する
- Segment IDはIGP domain内でglobal unique (<-> c.f. MPLS Label)

Segment Routing – Controllerによる制御



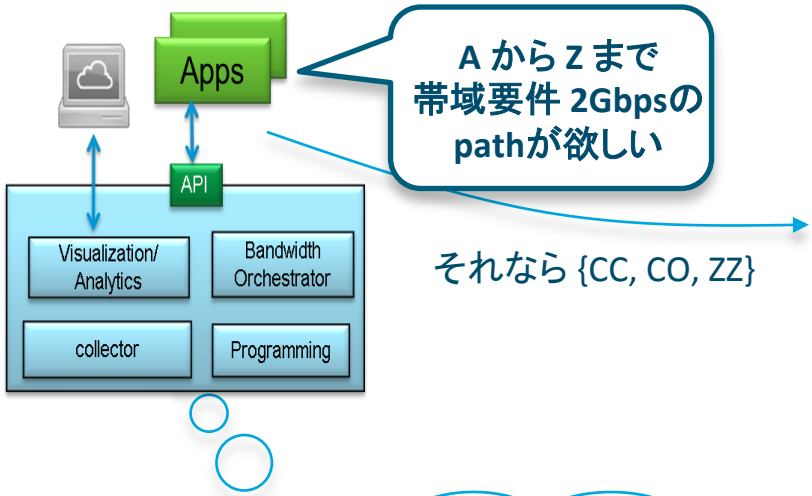
A から Z まで
帯域要件 2Gbpsの
pathが欲しい

C–D間回線の帯域使用率が高いため、SPF計算による経路ではそのSLA要件を満たせない



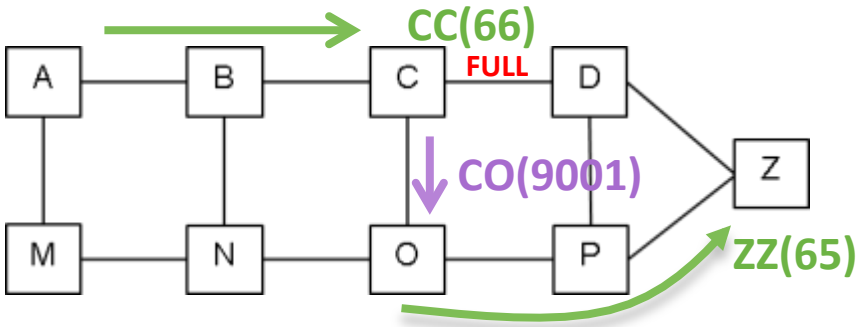
- SR Path : Shortest Pathに従うPATH

Segment Routing – Controllerによる制御



A から Z まで
帯域要件 2Gbpsの
pathが欲しい

それなら {CC, CO, ZZ}

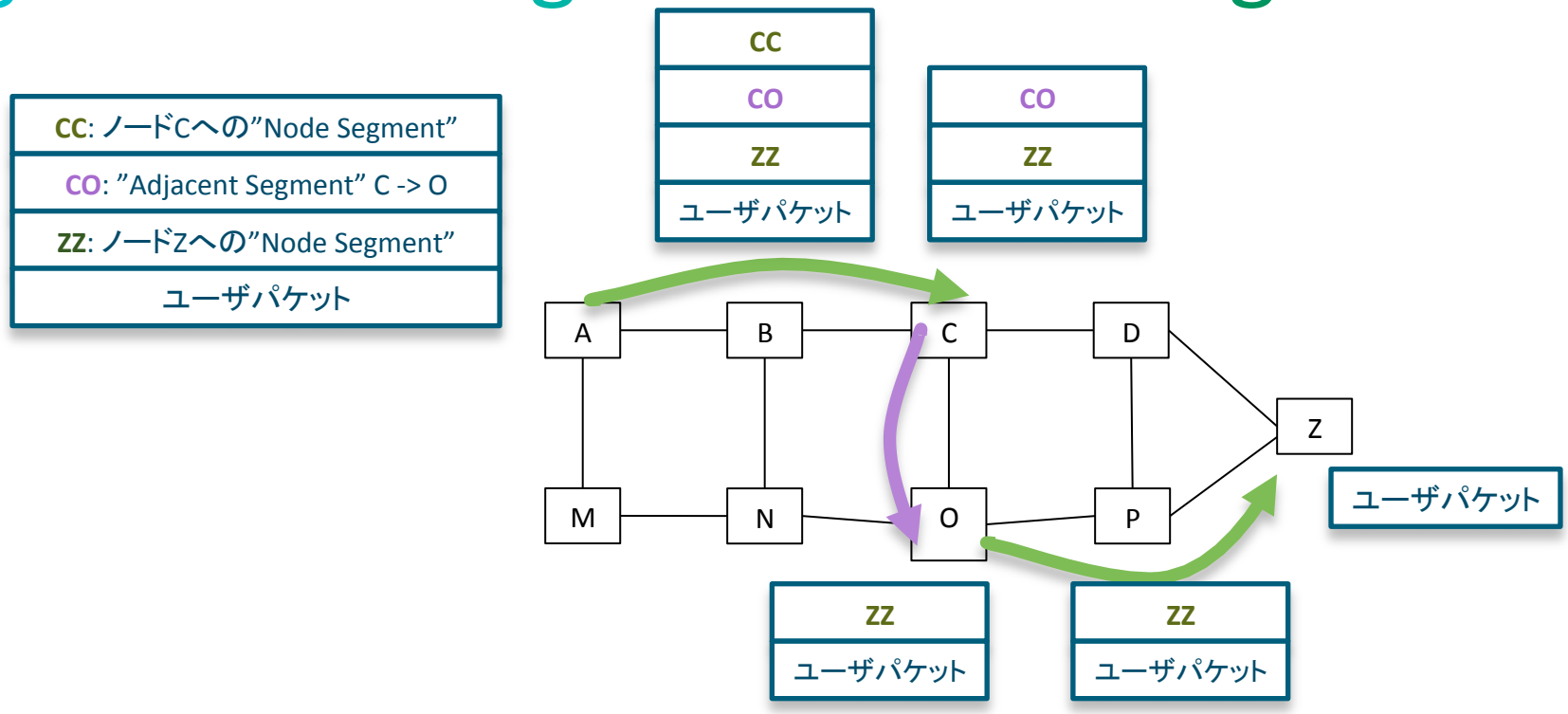


A-B-C-O-P-Zであれば要件を満たせる。
2Gの帯域を確保しよう。
Segment Listは{66, 9001, 65}

- SR TE Path : Traffic Engineered PATH

- Controller
  - そのSLA要件を満たすパスを発見する
  - NodeおよびAdjacency Segmentのリストをencodeする

Segment Routing - Source Routing



SourceにてHeader Stackを生成し、パケットを送出する

Pathは、Segment idのリストとして表現される。(Segment ID == Label, IPv6 data planeも可)

- 中継ノードは、Label Switching/Forwarding

Segment Routingのメリット

1. Simple !!!
   - 使用するControl PlaneはIGPだけ。LDP, RSVPは要らない。
     - LDP-IGP syncなどのstate syncも必要ない
2. 柔軟かつScalableなTraffic Engineering
   - Service毎のdisjoint topology
   - 帯域、latencyなどを加味したCSPF(Constraint SPF)
   - Stateless !
     - RSVP stateを持つ必要が無い
     - 全てのstateはヘッダ(Label Stack)にある
3. Transport的pathの運用にも有用
   - Controllerによる明示パス指定
   - MPLS-TP OAM, Bi-directional Co-routed LSP, Path Protection

目的に合った、
程よい、
集中と分散の配分
↓
究極のHybrid SDN

Draft Merged!

Merge draft-gredler-isis-label-advertisement-03 into draft-previdi-isis-segment-routing-extensions-01

[Docs] [txt|pdf] [Tracker] [Email] [Nits]

Versions: 00 01

IS-IS for IP Internets
Internet-Draft
Intended status: Standards Track
Expires: December 30, 2013

S. Previdi, Ed.
C. Filsfils
A. Bashandy
Cisco Systems, Inc.
B. Decraene
S. Litkowski
Orange
R. Geib
Deutsche Telekom
I. Milojevic
Telekom Srbija
R. Shakir
British Telecom
S. Y
TDC
W. Henderi
Alcatel-Luc
J. Tants
Ericsson
June 28, 2013

IS-IS Extensions for Segment Routing
draft-previdi-isis-segment-routing-extensions-00

[Docs] [txt|pdf|xml|html] [Tracker] [Email] [Diff1] [Diff2] [Nits]

Versions: 00 01 02 03

IS-IS for IP Internets
Internet-Draft
Intended status: Standards Track
Expires: November 22, 2013

H. Gredler, Ed.
Juniper Networks, Inc.
S. Amante
Level 3 Communications, Inc.
T. Scholl
Amazon
L. Jalil
Verizon
May 21, 2013

Advertising MPLS labels in IS-IS
draft-gredler-isis-label-advertisement-03

[Docs] [txt|pdf|xml|html] [Tracker] [Email] [Diff1] [Diff2] [Nits]

Versions: 00 01

IS-IS for IP Internets
Internet-Draft
Intended status: Standards Track
Expires: January 2, 2014

S. Previdi, Ed.
C. Filsfils
A. Bashandy
Cisco Systems, Inc.
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B. Decraene
S. Litkowski
Orange
R. Geib
Deutsche Telekom
I. Milojevic
Telekom Srbija
R. Shakir
British Telecom
S. Ytti
TDC Oy
W. Henderickx
Alcatel-Lucent
J. Tantsura
Ericsson
July 1, 2013

IS-IS Extensions for Segment Routing
draft-previdi-isis-segment-routing-extensions-01

Draft Merged!

Merge draft-gredler-ospf-label-advertisement-03 into draft-psenak-ospf-segment-routing-extensions-01

[Docs] [txt|pdf] [Tracker] [Email] [Nits]

Versions: 00 01

Network Working Group — P. Psenak, Ed.
Internet-Draft — S. Previdi, Ed.
Intended status: Standards Track — C. Filsfils
Expires: December 30, 2013 — Cisco Systems, Inc.
June 28, 2013

OSPF Extensions for Segment Routing
draft-psenak-ospf-segment-routing-extensions-00

[Docs] [txt|pdf|xml|html] [Tracker] [Email] [Diff1] [Diff2] [Nits]

Versions: 00 01

Open Shortest Path First IGP — P. Psenak, Ed.
Internet-Draft — S. Previdi, Ed.
Intended status: Standards Track — C. Filsfils
Expires: January 2, 2014 — Cisco Systems, Inc.
H. Gredler
Juniper Networks, Inc.
R. Shakir
British Telecom
July 1, 2013

OSPF Extensions for Segment Routing
draft-psenak-ospf-segment-routing-extensions-01

[Docs] [txt|pdf|xml|html] [Tracker] [Email] [Diff1] [Diff2] [Nits]

Versions: 00 01 02 03

Open Shortest Path First IGP — H. Gredler, Ed.
Internet-Draft — Juniper Networks, Inc.
Intended status: Standards Track — S. Amante
Expires: November 22, 2013 — Level 3 Communications, Inc.
T. Scholl
Amazon
L. Jalil
Verizon
May 21, 2013

Advertising MPLS labels in OSPF
draft-gredler-ospf-label-advertisement-03

Draft Merge Summary

- Common
  - Protocol Semantics
- Differences
  - draft-gredler-* builds on top of ***RFC3031*** and ***does not require*** a new architecture.
  - Draft-gredler-* proposes to re-use only ***existing data plane*** for source-routing (=MPLS)

Discrepancy in Opinion

ISSUE: SR-V6 dataplane is a *significant* change of IPv6 dataplane

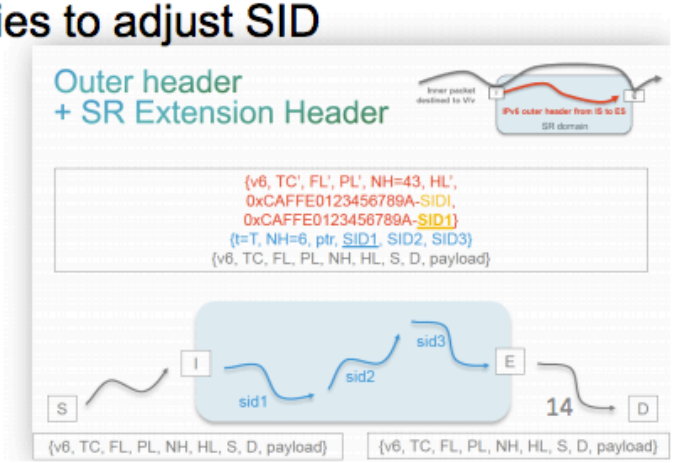
Proposal to create a ***source routing extension header***
- Issue: requires ***new Hardware*** to overcome first N-bytes lookup buffer limits, of deployed hardware

Data planes in routers (IPv4, IPv6, MPLS)
- Why need for data plane #4 ?

Use cases ?

MPLS ***is*** the ***'routing header'*** of IPv4 and IPv6 today

SR-v6 dataplane is ***more complex*** than MPLS Label operation
- Requires IPv6 address rewrite capabilities to adjust SID segment pointer



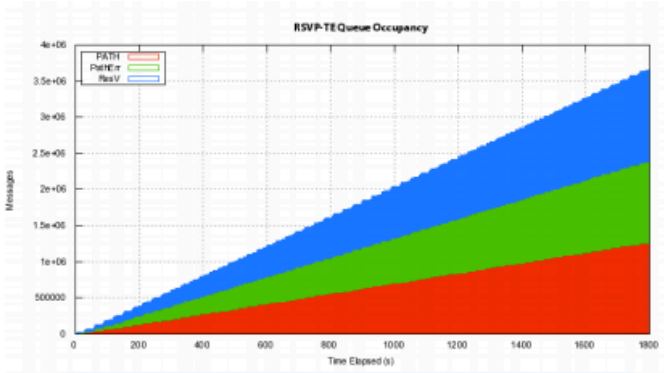
Use case #1

BT: Performance Based LSPs

Path Constraints and Technology Options.

- **Requirement for a number of types of constrained service/flow routing:**
  - Co-routing.
    - Considering SRLG/Node/Link diversity or bi-directional paths.
  - Affinity-based routing.
    - Diverging from SPT based on constraining available paths by colour/admin-group.
  - Performance-managed services.
    - Latency, available bandwidth, etc.
- Clearly, a number of these constraints can be delivered by RSVP-TE today.

- **Per-service/flow routing requires a significant increase in the number of RSVP-TE LSPs when compared to current deployments:**
  - Number of LSPs is greater than full mesh (already not recommended).
  - Scale limit of mid-point signalling during large failures.
- **Limited additional functionality is offered by having mid-point state.**
  - Generally only admission control.
  - Required in a subset of path routing scenarios.



Mid-point Overloading – Post-Mortem Model

Unbounded RSVP-TE queue growth based on inability to process PATH messages within LSP retry time – **LSPs never successfully re-signal.**

http://www.ietf.org/proceedings/87/slides/slides-87-status-0.pdf

Use case #2

DT: MPLS OAM

Segment Routing based OAM use case

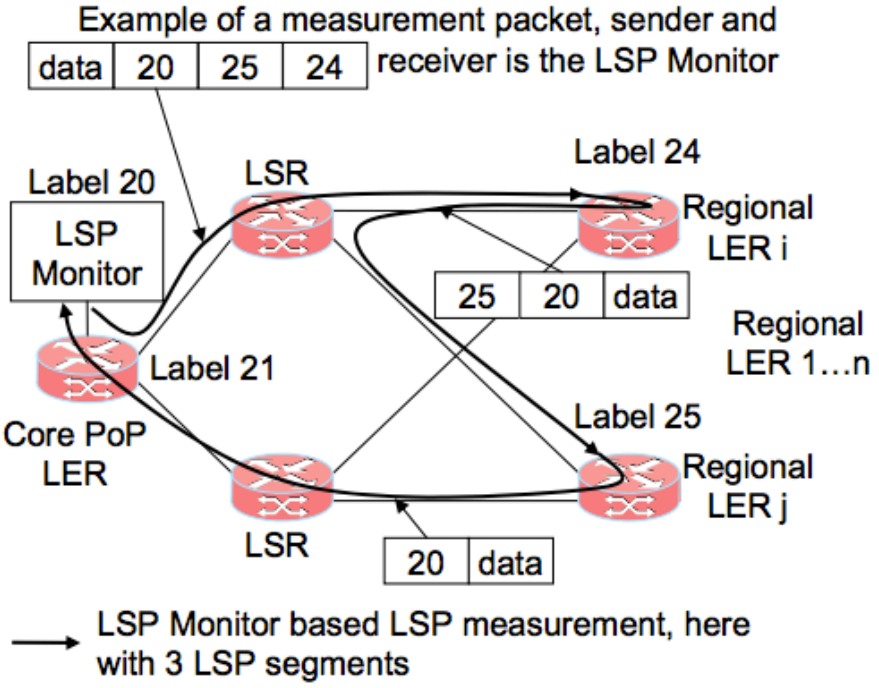
IETF 87, Berlin

Rüdiger Geib, Deutsche Telekom

Segment based Routing allows for scaleable LSP monitoring

Monitoring MPLS data plane liveliness

- source based routing allows execution of arbitrary LSP chains.
- then a ping with data plane loop can be built.
- by ISIS the LSP Monitor is aware of the network topology and its state.
- a single LSP monitor is able to adress all LSPs of a domain. A redundant design is possible if desired.
- Example to the right: the LSP monitor checks data plane liveliness between LER i and LER j. In general, by the method shown all LSPs can be monitored.



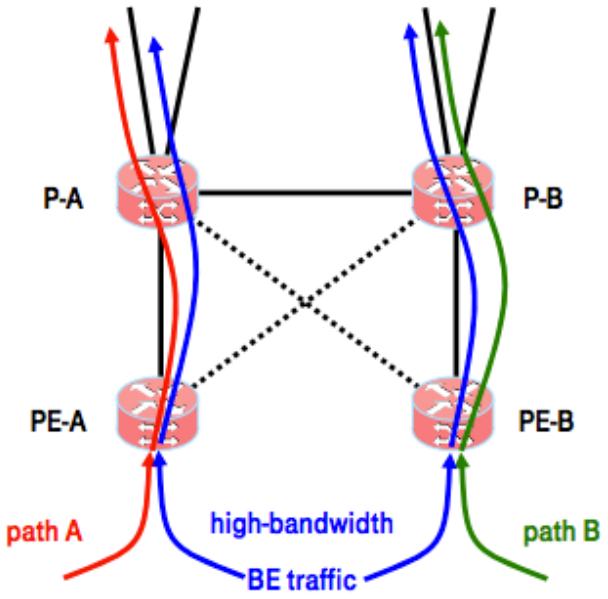
http://www.ietf.org/proceedings/87/slides/slides-87-status-1.pdf

Use case #3

DT: Disjoint Path and QoS based routing

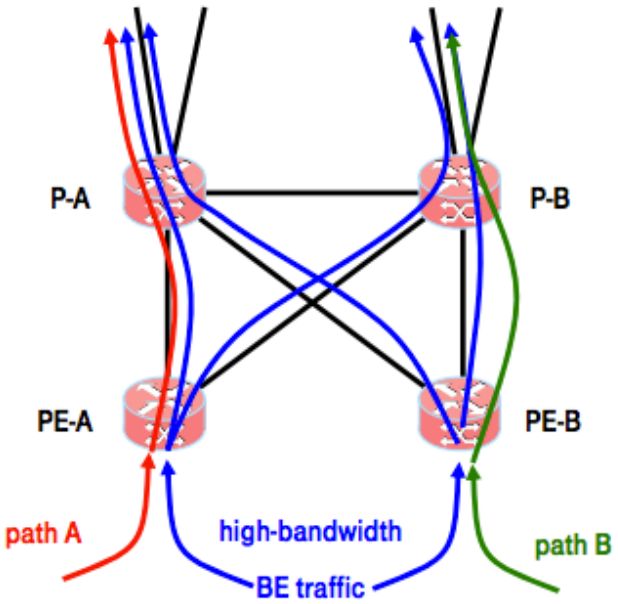
Merged network:

- Topology tailored for both disjoint paths and IP-FRR.
- Limited efficiency.



Optimized future network with SR:

- Basic topology optimized for IP-FRR and efficiency.
- Sigtran traffic constrained with A/B anycast segment to provide disjoint paths.



LIFE IS FOR SHARING.

Dr. Martin Horneffer / SR Use Cases @ DT 7/29/2013

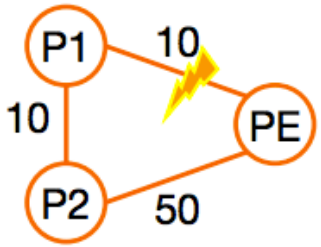
http://www.ietf.org/proceedings/87/slides/slides-87-status-2.pdf

Use case #4

Orange: FRR (Fast Reroute)

Incremental deployment in a LDP network

- As first step, Segment Routing use may be restricted to FRR backup path.
  - Keeping LDP for nominal traffic, like the way it currently is.
- If nodes are already SR capable, SR FRR can be deployed incrementally on a per PLR basis. (with incremental benefit).
  - i.e. enabling SR FRR on P1



- In the absence of SR capable node in the network, SR FRR can be deployed incrementally on a per PLR + (last) P + (first) Q basis.
  - i.e. enabling SR FRR on P1 (PLR) & SR on P2 (P) and PE (Q)
  - Note that on the Q, SR may be replaced by a T-LDP session (which is natively the case in the above example)
- More details in draft-filsfils-rtgwg-segment-routing-use-cases-01#section-6.4

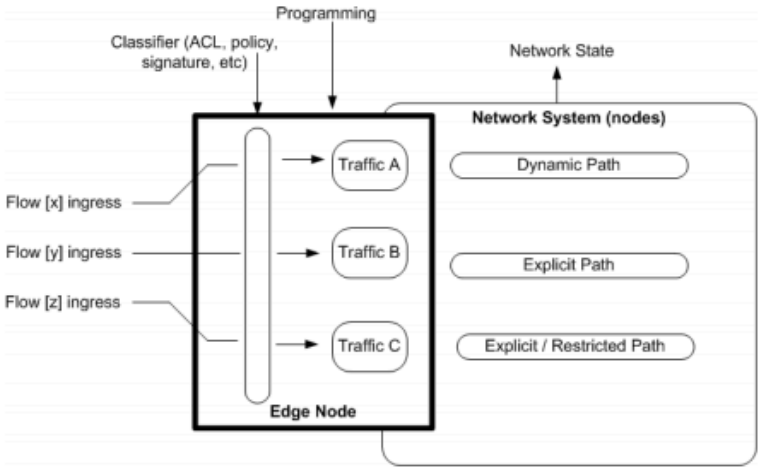
http://www.ietf.org/proceedings/87/slides/slides-87-status-3.pdf

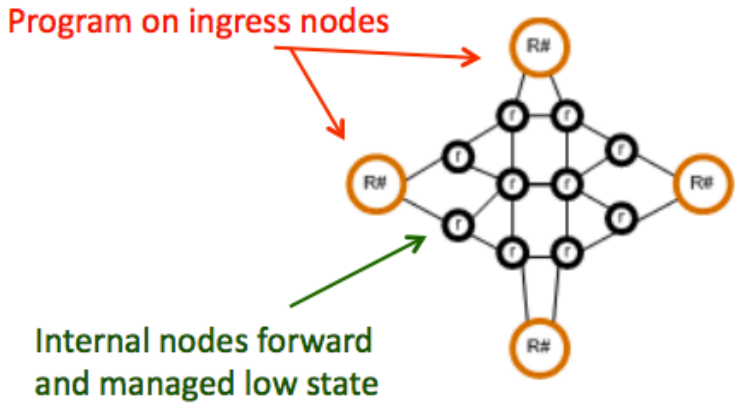
Use case #5

Rogers: Converged Multi-network operation

Programming and SDN Interaction

- Automation of the network is essential for future operation
  - Current operational modes not scalable
- SDN (path programming within this document's context) is desired, with per-flow/service network treatment
- Minimize the number of elements where programming must occur, and simplify configuration required

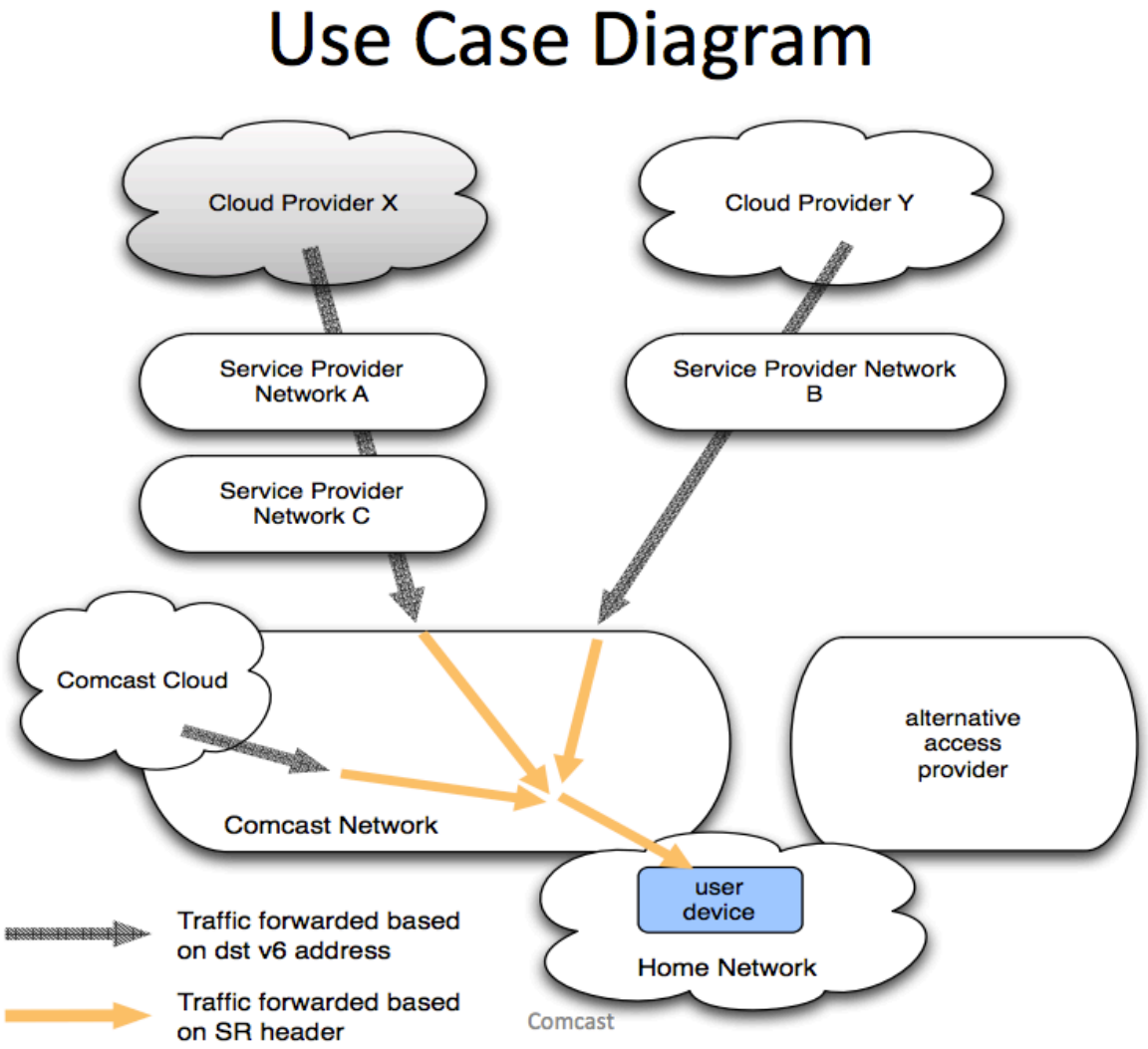




http://www.ietf.org/proceedings/87/slides/slides-87-status-4.pdf

Use case #6

Comcast : IPv6 use case



http://www.ietf.org/proceedings/87/slides/slides-87-status-11.pdf

Status BoF - Conclusion

- 多くのUse caseと熱気　→　今後もdiscussion継続
- このための特別なWGが必要か　→ 特に必要はなさそう
- どのWGが適切か? RTGWGかな?（明確な結論にはならず）

http://www.ietf.org/proceedings/87/minutes/minutes-87-status

[その後のMLによる議論]

- WGは設立される方向..
- Namingで大揉め中

Related I-Ds

- Architecture (draft-filsfils-rtgwg-segment-routing)
- Use-Case (draft-filsfils-rtgwg-segment-routing-use-cases)
- ISIS extension for SR (draft-previdi-isis-segment-routing-extensions)
- OSPF extension for SR (draft-psenak-ospf-segment-routing-extensions)
- FRR with SR (draft-francois-sr-frr)
- PCEP extension for SR (draft-sivabalan-pce-segment-routing)
- Performance Engineered LSP using SR (draft-shakir-rtgwg-sr-performance-engineered-lsps)

http://www.segment-routing.net/

Agenda

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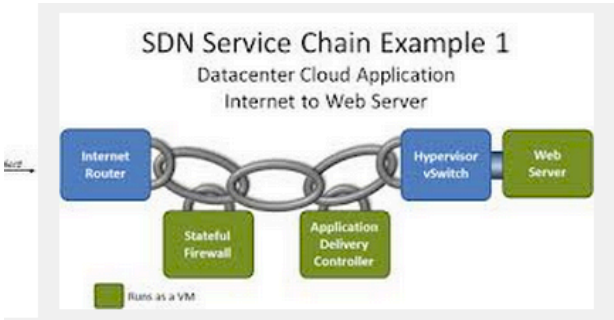
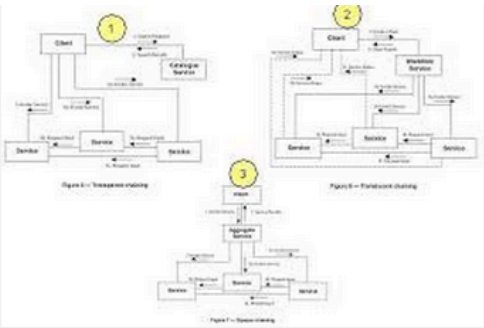
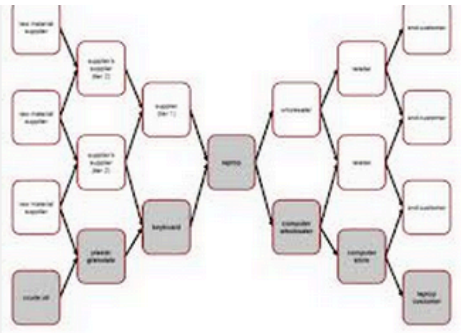
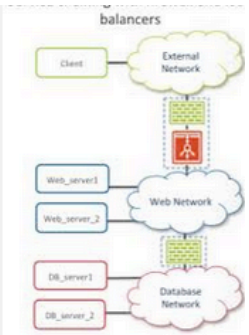
- *NSC BoF*
- WGs
  - SDNRG
  - NVO3WG
  - I2RSWG

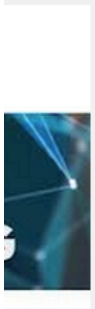
Service Chaining !!

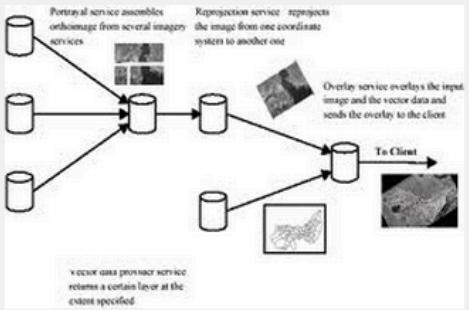


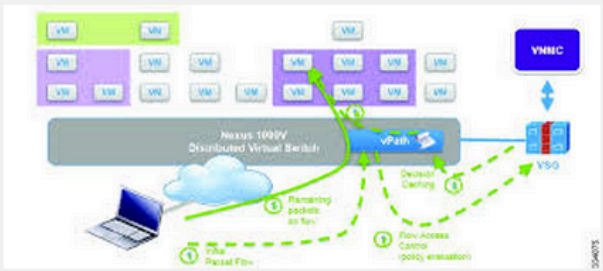


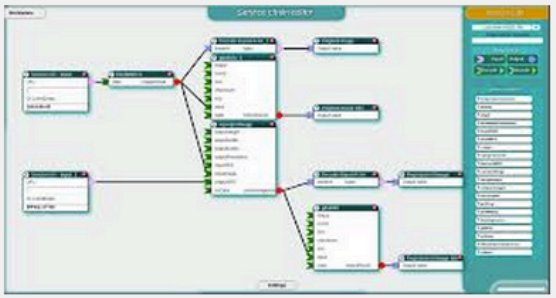


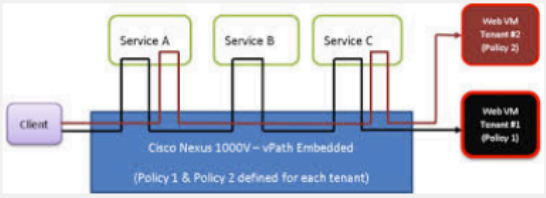


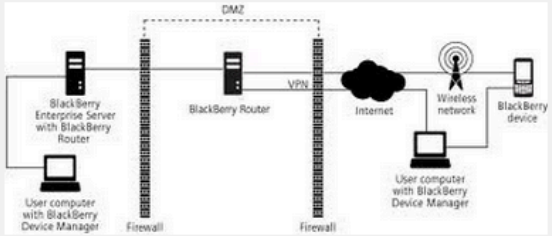


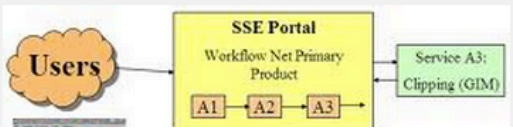


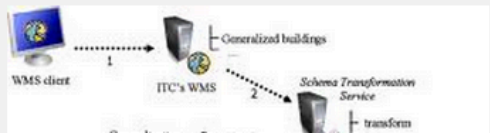








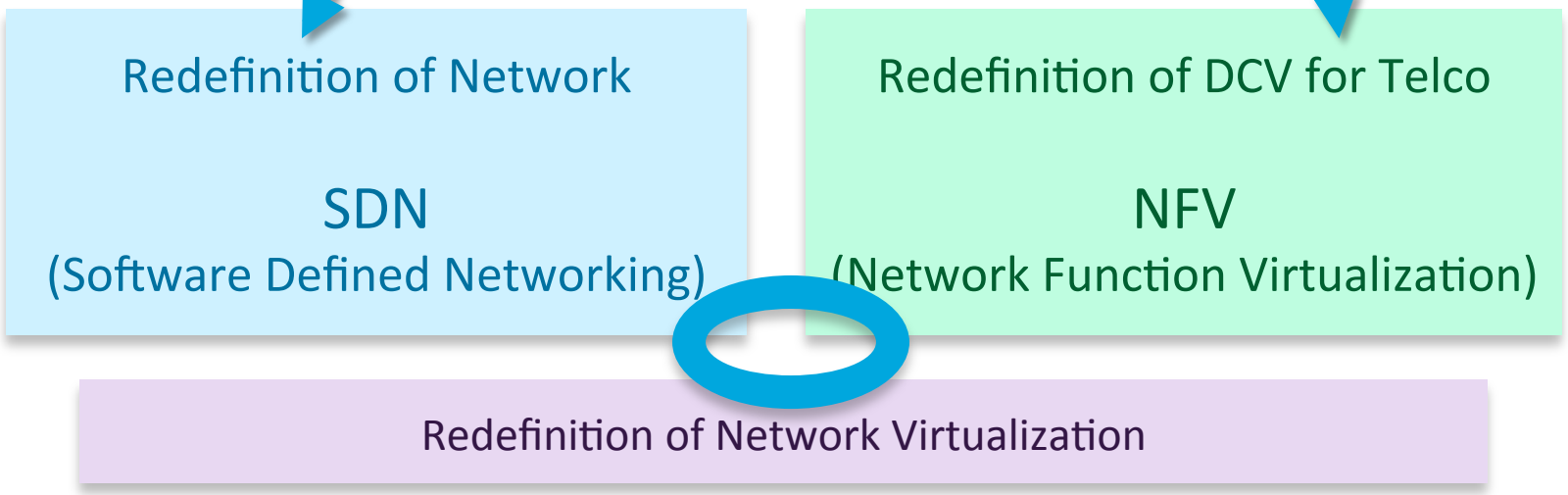




Why so hot? - SDN and NFV..!

(Background)

- Server Virtualization has enabled Automation, Elasticity, Flexibility
- Programmability has been required also for Network



Motivation ?!

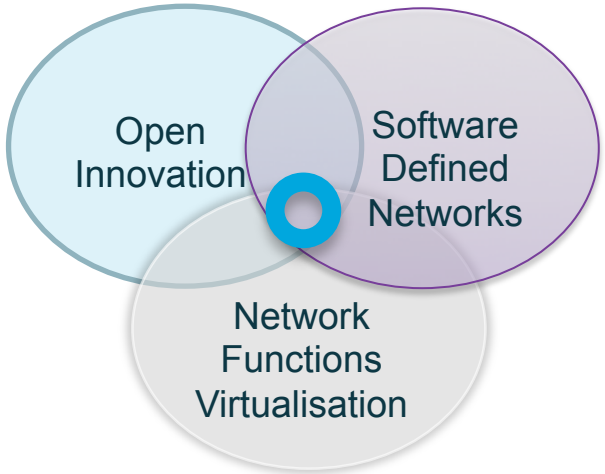
NFV, Multi-tenancy virtual private cloud

Requires

Service Chaining

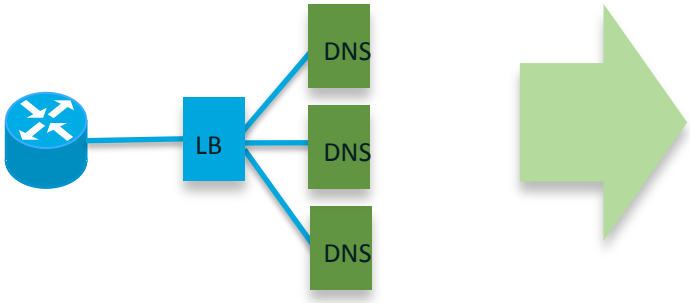
Enables

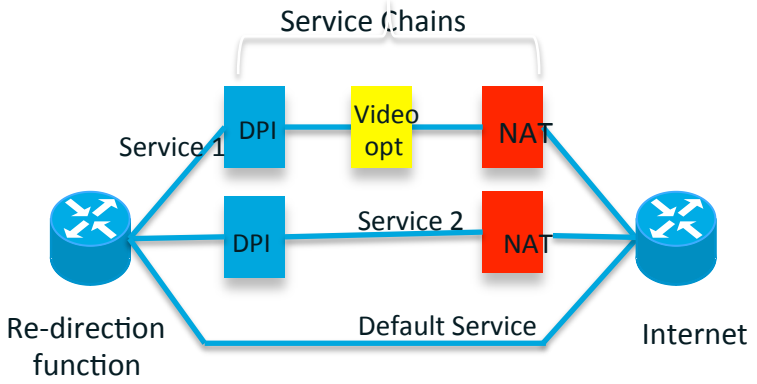
SDN(Flow/Path Programmability)



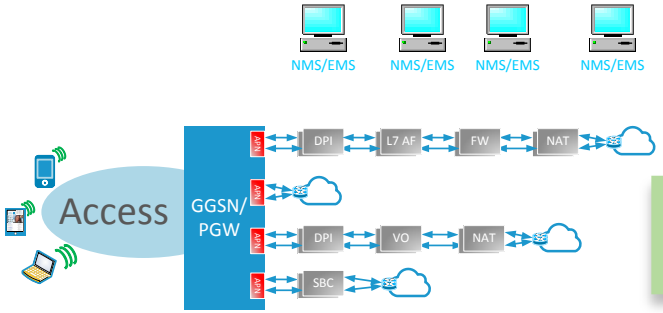
(Source) NFV whitepaper

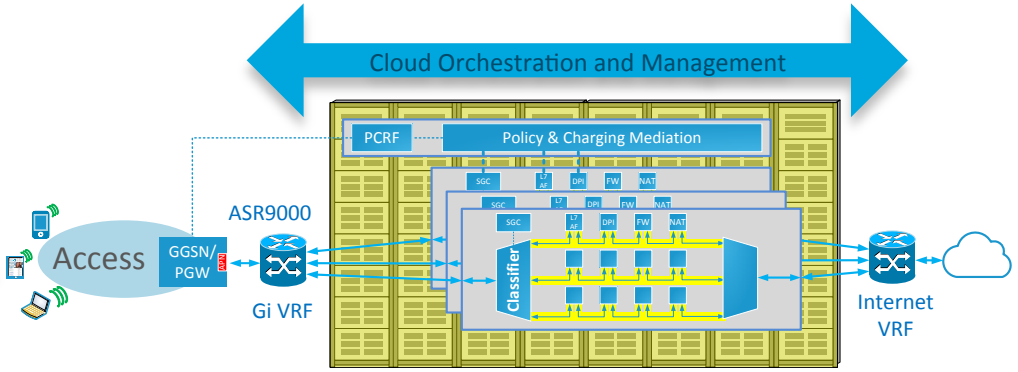
NSC Problem Definition





- Simple
- Complicated (per-subscriber, per-app)





- Physical, Static
- Virtual, Dynamic

NSC BoF ?!

- Network Service Chaining
  - 現在のネットワークサービスの配備はstaticであり、下記のような要請に充分に対応できていない
    - Multi-tenancy, Virtualization, Elasticity, Rich Classification
  - “Service Chain”により、サービスの追加を、multi-tenant対応、トポロジー非依存に行い、またサービスノードとのデータ交換を可能にする

(裏情報)
BoFを呼びかけたのはCisco。

NSC BoF ?!

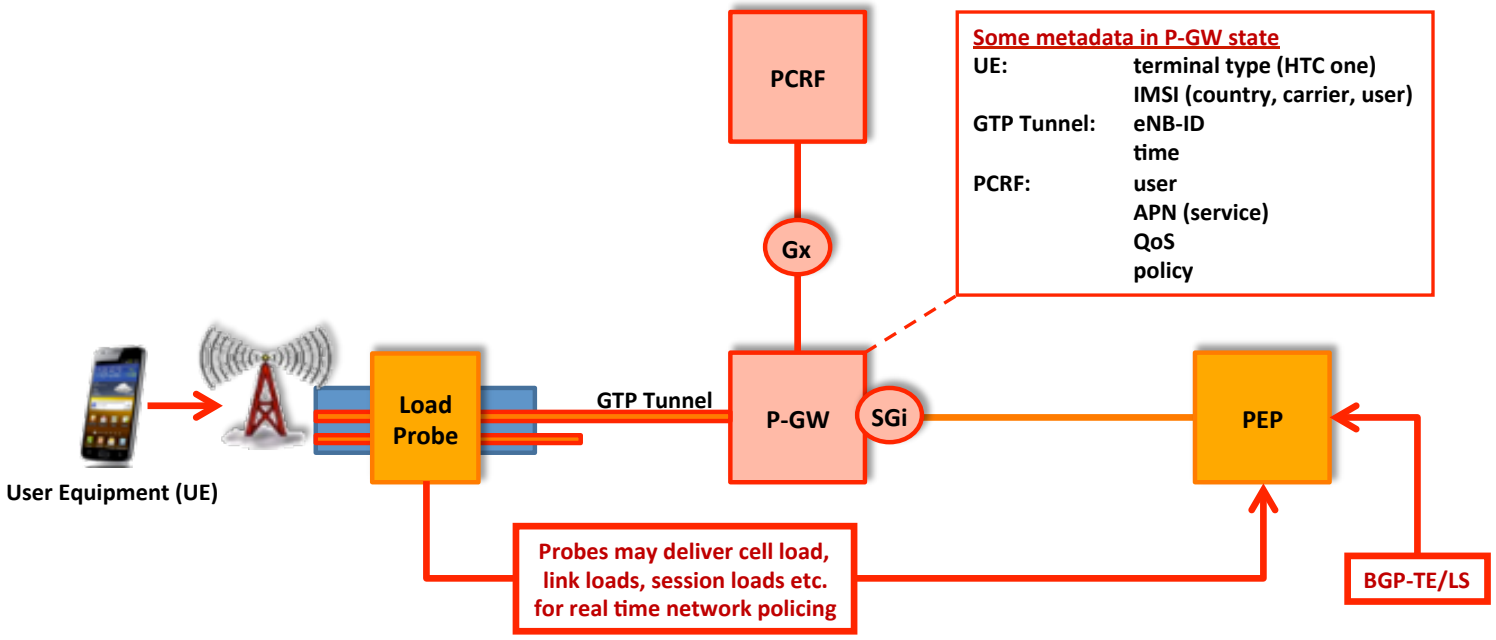
- BoFの目的
  - Use caseと、NSC(Network Service Chaining)の背後にある課題を調査吟味する。
  - ネットワーク・サービス事業者が、Use caseを発表する場とする
    - 今回のBoFではSolutionや個人提案に関しては議論しない
  - WGを立ち上げるためのBoF(WG-forming BoF)ではない
    - WGを立ち上げるか否かや、WGのcharterは議論しない
    - 今後時期を見て、WG立ち上げの判断を行う
  - 今回の論点
    - 標準化作業が必要な重要な課題か、という点ついて合意するか
    - IETFはWGを立ち上げる方向で作業を進めるべきか
    - この件につき、どの程度の人数の人が作業したいと思っているか

Use case #1

DT, Vodafone : Mobility Gi-LAN

Requirement: High Degree of Freedom in Chain Creation

Network provides us with sufficient Metadata to differentiate

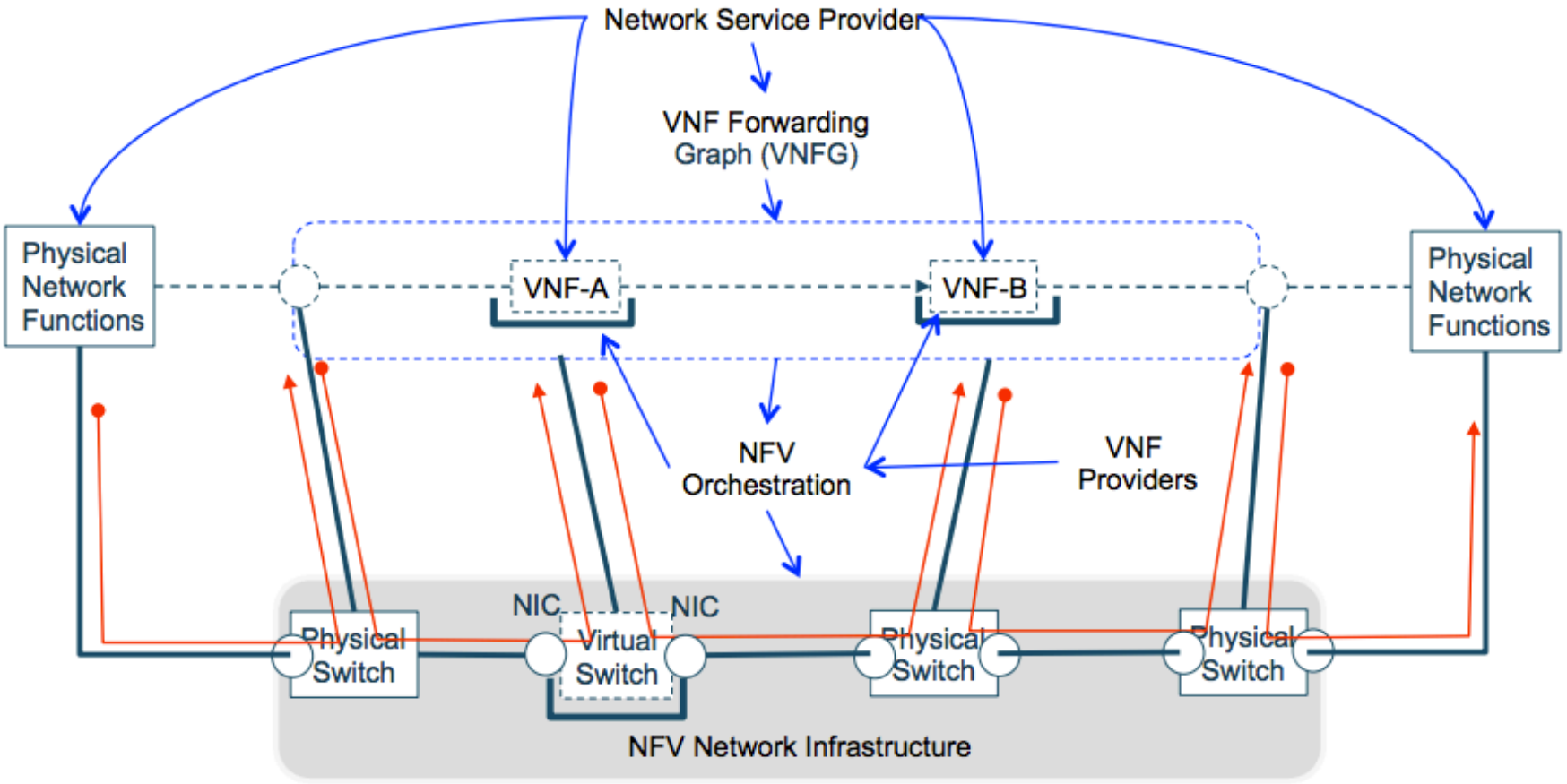


- We may connect all relevant service functions with all relevant sources for metadata or
- We may piggyback metadata information with the IP packets traversing a service chain.
- Piggybacking metadata seems to be more straightforward than picking them out with DPI.

http://www.ietf.org/proceedings/87/slides/slides-87-nsc-1.pptx

Use case #2

Telefonica : NFV forwarding graph



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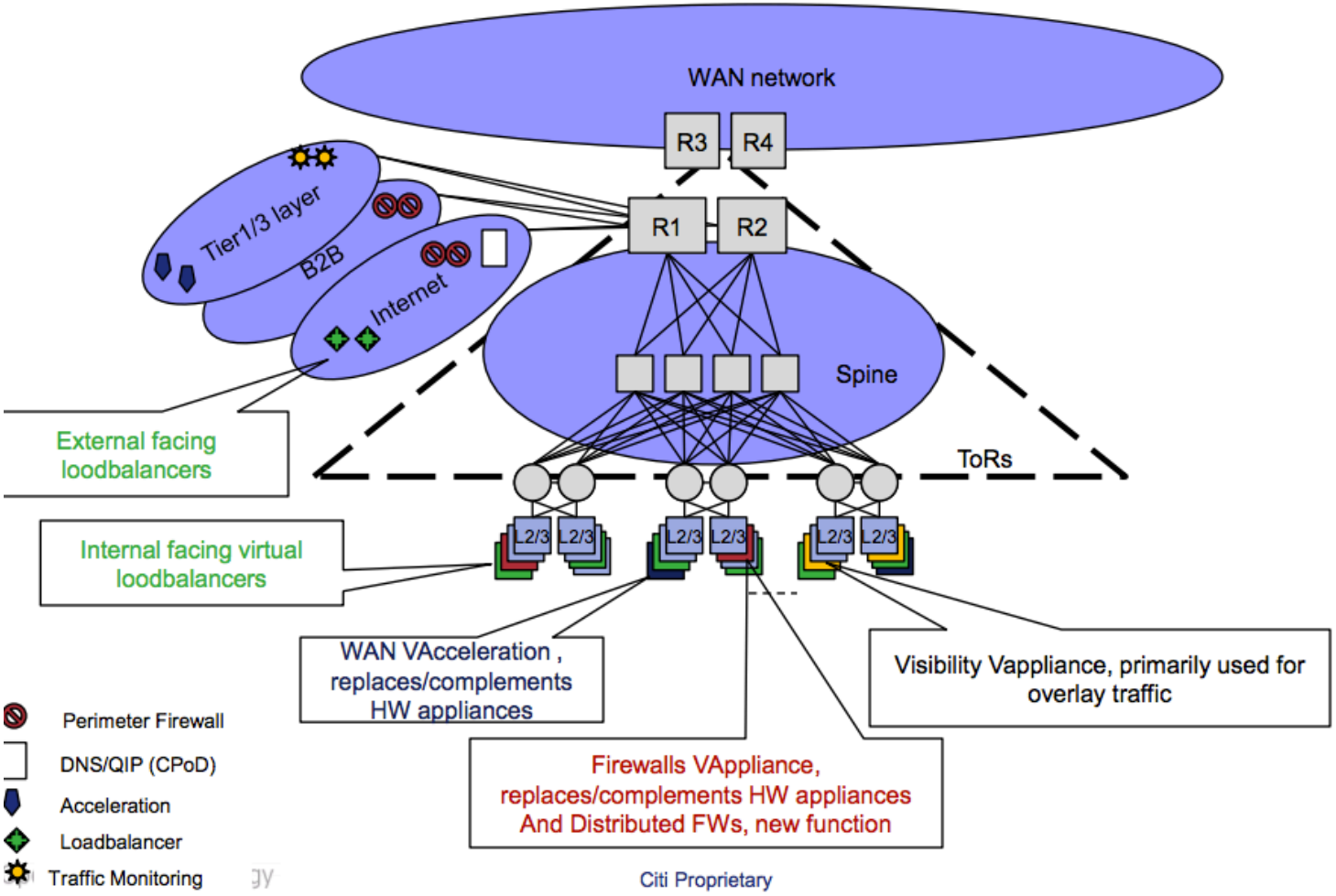
Use case #3

Citibank : Enterprise Data Center Use Case



http://www.ietf.org/proceedings/87/slides/slides-87-nsc-2.pptx

Use case #4

Rackspace : Cloud provider Use Case

What context will we share?

Anything you can't fit into an existing header that you don't want to extract with DPI at every service.

- UserID inserted by a trusted source.
- OAM (underlay discovery, packet debugs)
- Direction
- Pipeline stage index
- Version
- Compliance

http://www.ietf.org/proceedings/87/slides/slides-87-nsc-6.pptx

NSC BoF - Conclusion

- Supportive comments from operators, middlebox vendors, etc.
- Technical details may still be a bit vague at this stage
- At least:
  - IETFにとって重要なトピックか → yes
  - 今後IETFで作業すべきか → yes

http://www.ietf.org/proceedings/87/minutes/minutes-87-nsc

[その後のMLによる議論]

- 次回は、WG-forming BoFを実施

Related I-Ds

- Network Service Chaining Problem Statement, (draft-quinn-nsc-problem-statement-00)
- Network Service Header, (draft-quinn-nsh-00)
- Common Metadata Header Format for IP/MPLS Networks, (draft-guichard-metadata-header-00)
- Carrying Metadata in MPLS Networks, (draft-guichard-mpls-metadata-00)
- Carrying Metadata in IP Networks, (draft-bryant-ip-metadata-00)
- Differentiated Network-Located Function Chaining Framework (draft-boucadair-network-function-chaining-02)
- Virtual Topologies for Service Chaining in BGP IP VPNs, (draft-rfernando-l3vpn-service-chaining-01)
- Generic Protocol Extension, (draft-quinn-vxlan-gpe-00 | draft-lewis-lisp-gpe-00)

Network Service Header

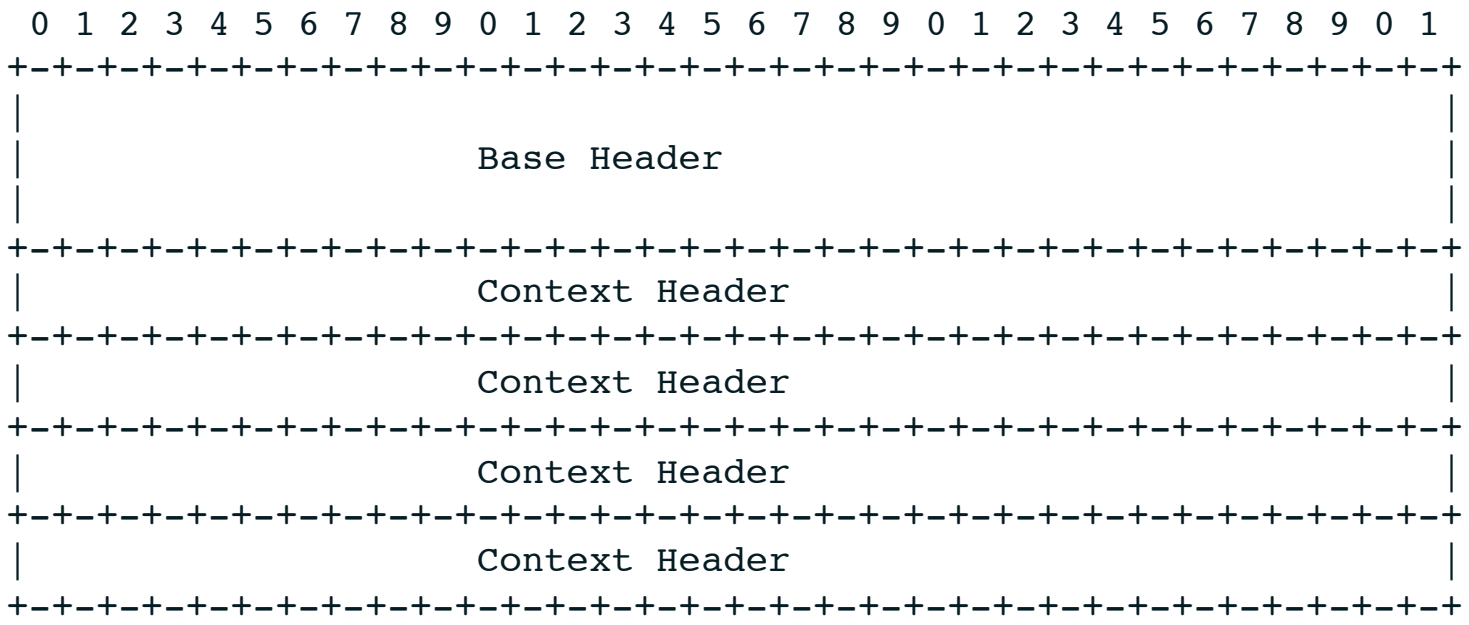


Figure 1: Network Service Header

- Transport Independent
- Fixed Length (32 bit * 6)
- Meta data sharing for various purpose

http://tools.ietf.org/html/draft-quinn-nsh-00

Agenda

- Status BoF
- NSC BoF
- *WGs*
  - SDNRG
  - NVO3WG
  - I2RSWG

SDNRG

Software Defined Networks Research Group

- Novel Applications for an SDN-Enabled Internet Exchange Point
- Time-based Updates in Software Defined Networks
- Formal verification for software-defined Networks
- Secure and dependable Software Defined Networks
- Impacts of source routing/MPLS label stacks on SDN convergence
- LISPflow: a SDN enabler
- Update on NfV and how it fits with other I{E,R}TF activities
- I2RS and SDN

NVO3WG

Network Virtualization Overlay

- WG documents review
  - Framework
  - Use cases
- Requirements and Gap analysis
  - Data-plane, Operation, Security
  - Gap analysis
- Architecture
- New drafts (no time for discuss)
  - TRILL directory
  - NaaS requirement

VXLAN, NVGRE

→ Informational…

I2RSWG

Interface to Routing System

- Interface to Routing System
  - Real-time, Asynchronous
  - Using efficient data-models and encodings
- Drafts under discussion
  - Architecture (draft-atlas-i2rs-architecture-01)
  - RIB information model (draft-nitinb-i2rs-rib-info-model-01)
  - Problem Statement (draft-atlas-i2rs-problem-statement-01)
  - Information Model for Network Topology (draft-medved-i2rs-topology-im-00)
  - Service Chaining use case (draft-bitar-i2rs-chaining-00)
  - BGP use case (draft-keyupate-i2rs-bgp-usecases-00)

Thank you !!