

Intent-based Routing

draft-li-teas-intent-based-routing-00

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Introduction

- [I-D.hegde-spring-mpls-seamless-sr] describes the requirements for end-to-end intent-based paths spanning multi-domain networks.
- [I-D.kaliraj-idr-bgp-classful-transport-planes] specifies the BGP based mechanisms to signal the packet paths which span multiple domains and provide different SLA characteristics.
- Since these inter-domain SR paths need to setup according to the pair <color, endpoint>, it means more SR paths need to be introduced in multiple domains, this will cause more challenges on scalability.
- In order to reduce the scalability challenge introduced by the inter-domain routing with different service requirements, this document proposes the intent-based routing mechanism through which intent information is carried in the data packet, and the network node can steer the packet into the SR policy to satisfy the service requirement (that is, meet the specific intent).
- Besides steering the packet into the SR policy, the intent-based routing mechanism can also be used to steer the traffic into the underlay network slice (e.g. VTN) to meet the specific intent, or enforce policy for other intents such as network measurement, security, etc.

Intent-based Routing (1)

- **Color:** [I-D.ietf-spring-segment-routing-policy] defines the color used for the SR policy. The color is a 32-bit numerical value that associates the SR Policy with an intent (e.g. low-latency).
- **Intent:** Intent-based routing mechanism introduces the concept of intent as the information carried in the data plane to represent the specific service requirement for the destination on the network. The intent can be associated with a series of service attributes, such as low latency and high bandwidth.
- **Mapping between Intent and Color:**

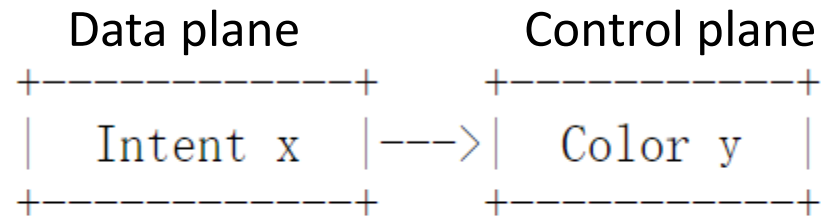
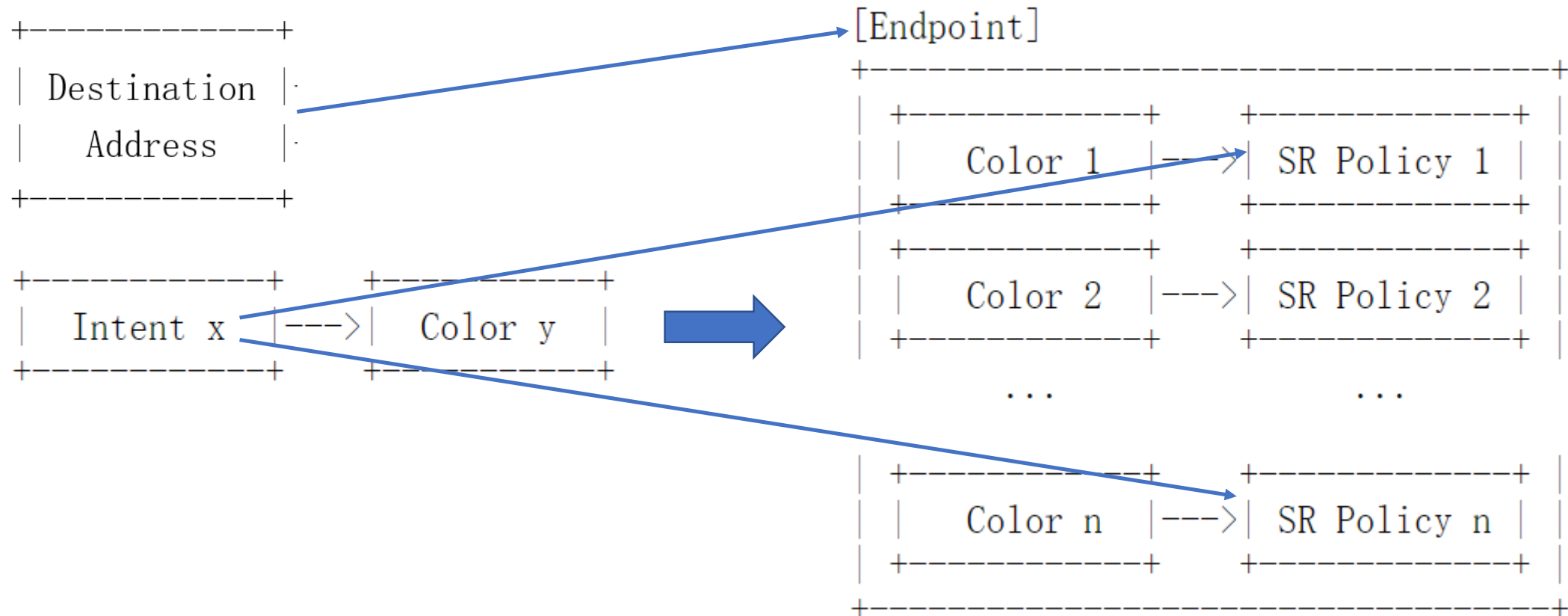


Figure 1 Mapping between Intent and Color

- Intent can also be used for other purposes such as network measurement, security, etc.

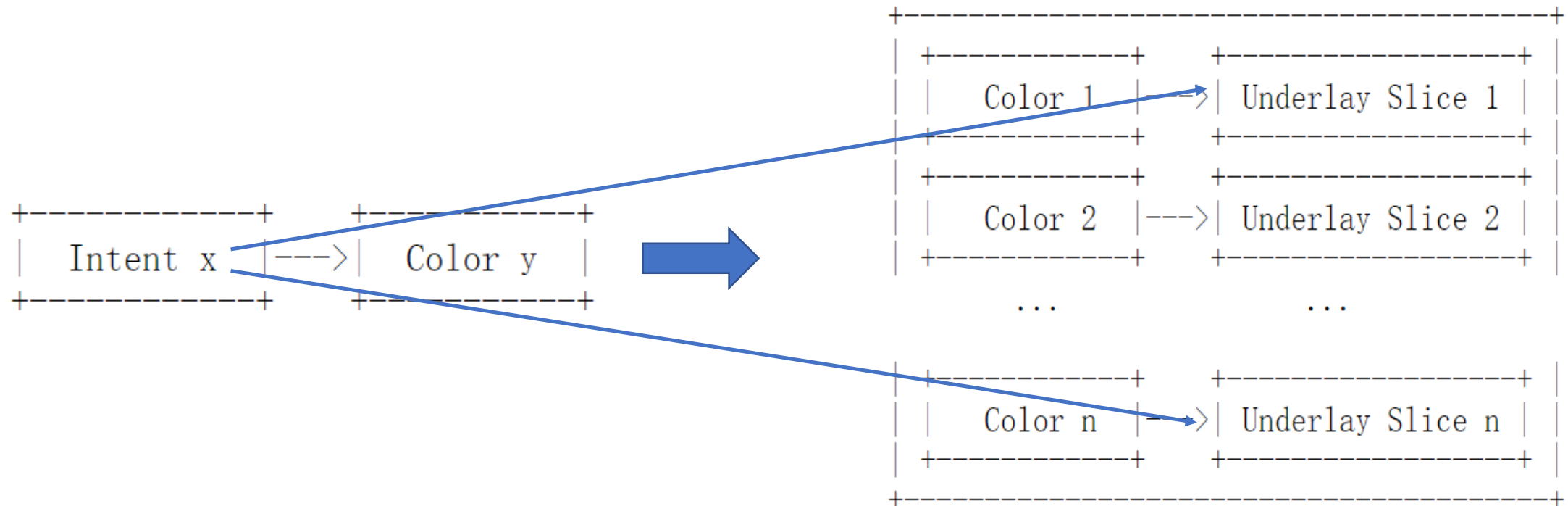
Intent-based Routing (2)

- The SR policy group including mappings between colors and SR policies for a specific Endpoint can be set up in the data plane in the local network domain. That is, it is not necessary to advertise the pair <color, endpoint> to set up the end-to-end SR path.
- Map the packet to the specific SR policy according to the destination address and intent information in the packet for the purpose of traffic steering.



Intent-based Routing (3)

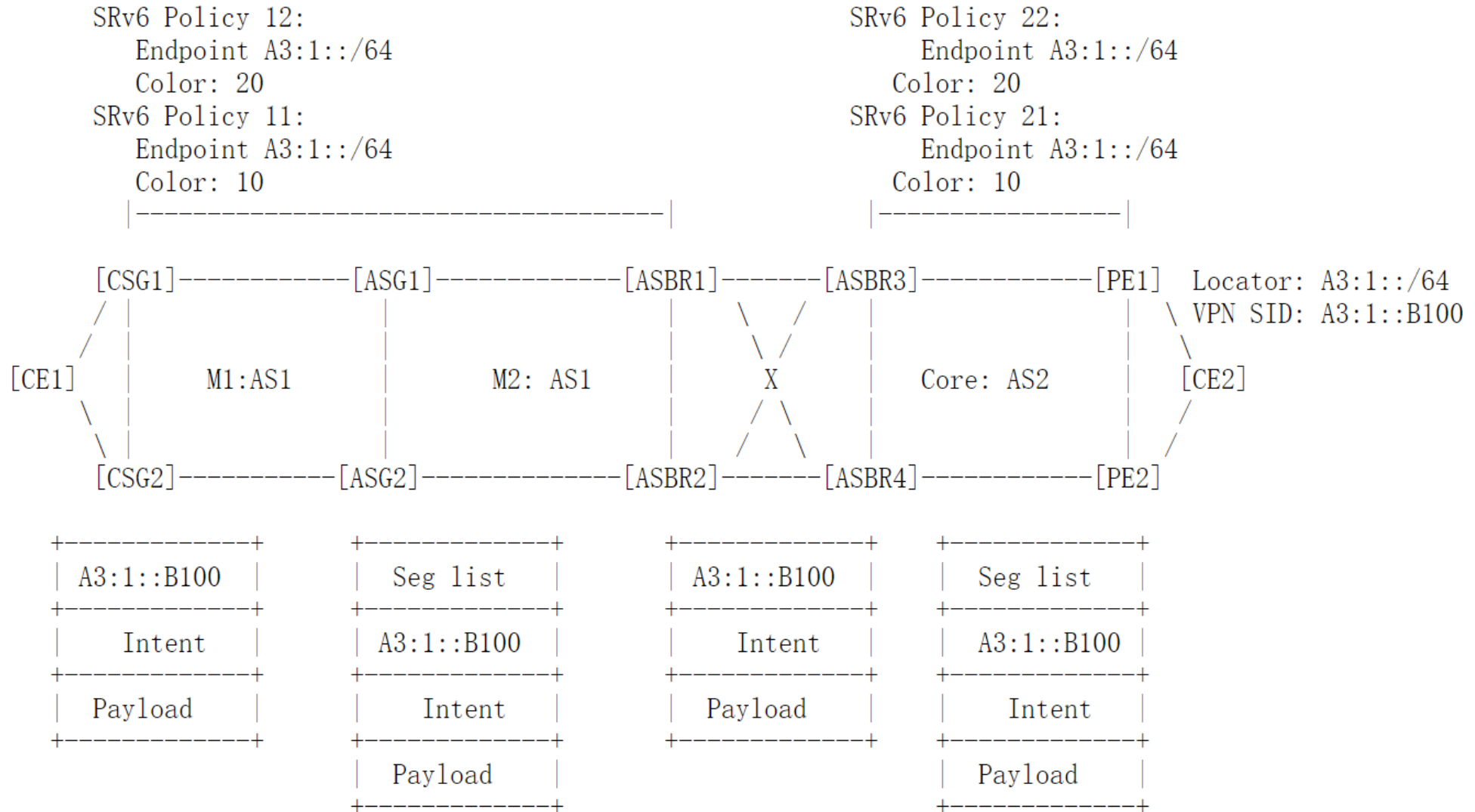
- Mapping between color and the local underlay network slices can be set up in the data plane in the local network domain. Color used for SR policy can also be used for the IETF network slice for the possible unified mapping process.
- Map the packet to the specific local underlay network slice according to the intent information in the packet for the purpose of traffic steering.



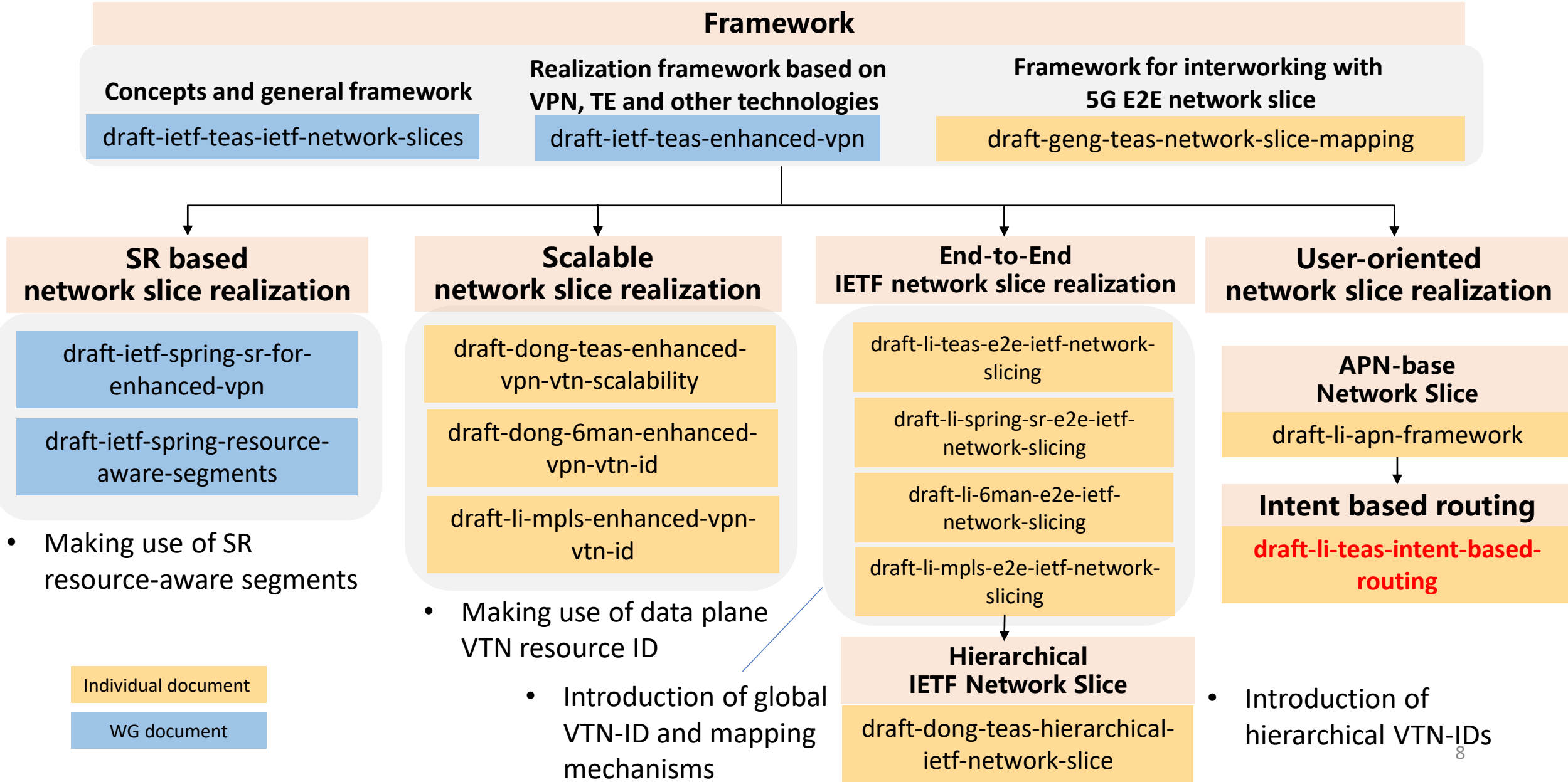
Intent-based Routing (4)

- Scalability: The mapping between the intent and the SR policy can be done locally without the need of advertising the label binding for the pair <color, endpoint> to stitch the SR path in different local domains.
- Flexibility: Since the same Intent may be satisfied by the SR policy or the underlay network slice, the local network domain can choose the different solutions flexibly without the need of coordination with other network domains. This can also improve the flexibility of the inter-domain routing.
- Extensibility: Besides steering the packet into the SR policy or the underlay network slice, the network node can also enforce the policy for other possible intents such as network measurement, security, etc.

Illustration of Intent-based Inter-domain Routing

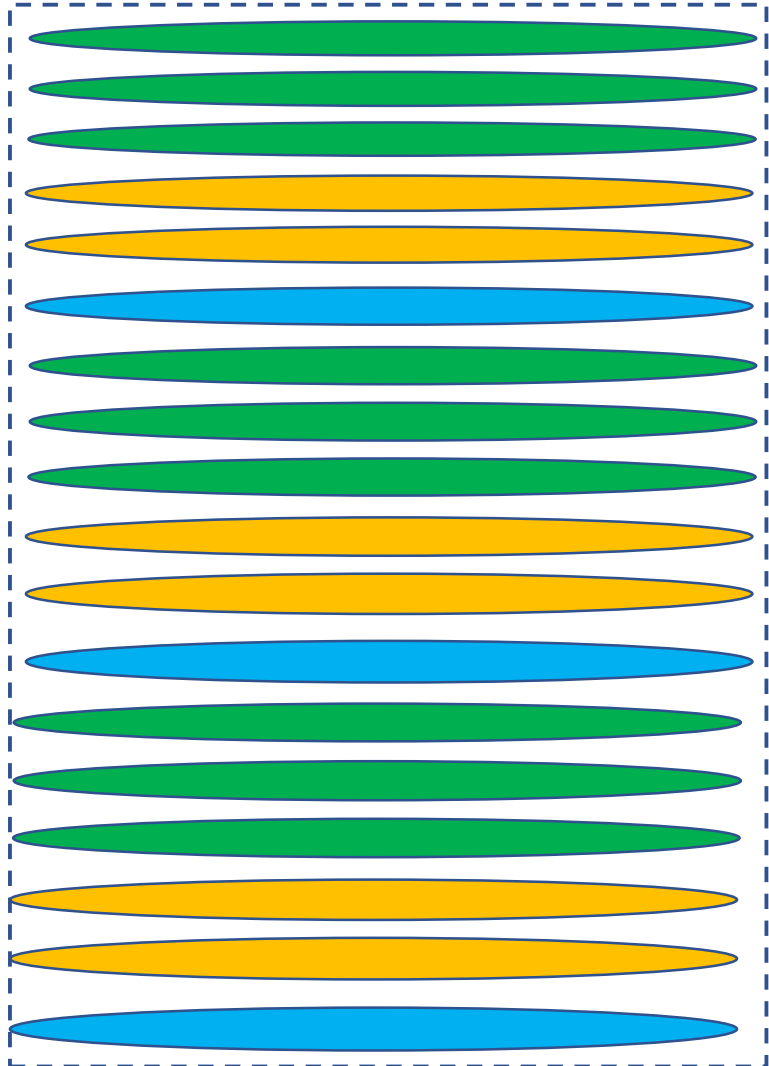


Relationship between Intent-based Routing and IETF Network Slice Realization



Mapping of Network Slice Service to Underlay

IETF Network Slice Services



UNI User Side

Per-VPN instance →

“Color” of service route →

(e.g. Low Latency, High BW)

“Intent” in data packet →

(e.g. color-like such as Low Latency and High BW; more intent such as network measurement and security)

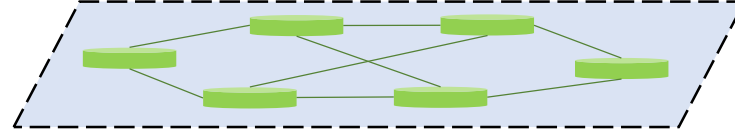
APN based →

user group/app groups or user-group/app-group-level Intent
(e.g. User group: office, R&D, App group: audio, video)

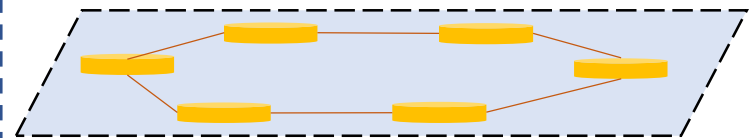
NNI

Network Side

SR-based VTN: Resource-aware SIDs



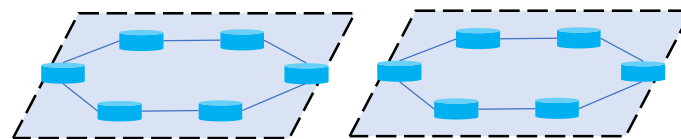
Scalable VTN: VTN resource ID



Global VTN ID

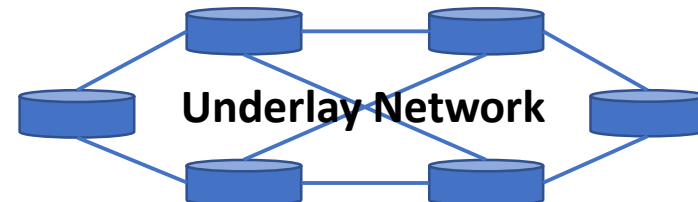
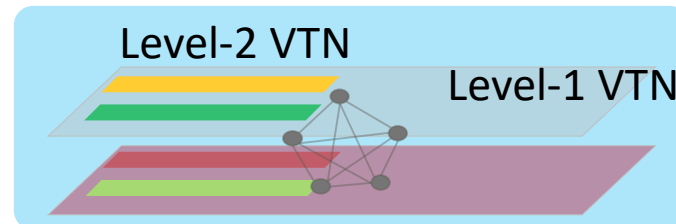
local VTN ID

local VTN ID



Level-2 VTN

Level-1 VTN



Next-Step

- Solicit comments and refine the draft accordingly
- Cooperation are welcome
- Possible implementation and verification

Thank You