

ARN - Make SRv6 Service visible to user

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draft-yang-rtgwg-arn-framework-02

Feb 18, 2024

Motivation

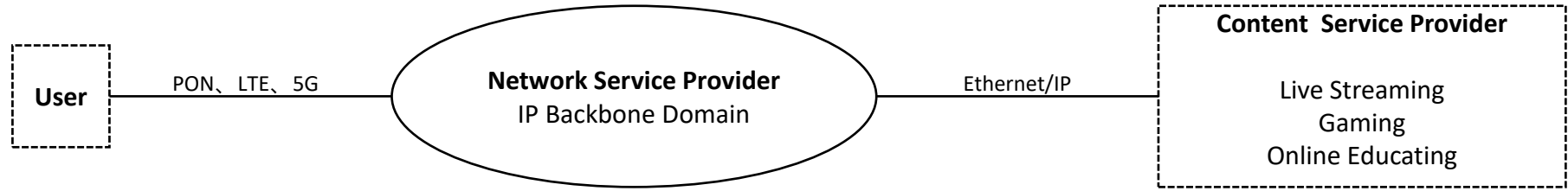
- **Fact:** IP protocols are evolving to SRv6, e.g. China Mobile's IP networks has already evolved to SRv6(G-SID) in 2023.
- **Idea:** Fully leverage SRv6, turn investment into revenue?
 - *2B products: ~ 20% revenue, mainly for L2VPN/L3VPN/EVPN high quality services
 - *2C/2H products: ~ 70% revenue. Mainly best effort service in low price.
- **Problem:** How can we provide SRv6 based services without running it on last mile.
 - SRv6 is running within limited domain
 - End users are outside limited domain

*note: 2B for to enterprise. 2C for to mobile user. 2H for to residential user

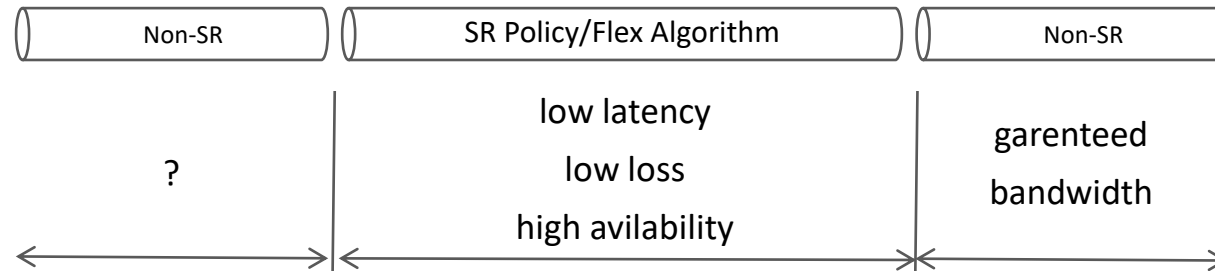
Why we need a new mechanism

- Expected capabilities:
 - APP traffic can be steered onto expected SR policy or slice
- Existing tools:
 - QoS: within trust domain
 - ACL: not scallable
 - DPI: privacy and expensive
 - NSH: within trust domain
- We need a new mechanism
 - Trustable: worked like QoS, anti-falsify, anti-spoofing, privacy protect, etc
 - Scallable: solve acl scallable problem, should be aggregatable
 - Simple: easy to deploy and implement
 - Others: inter-domain scenarios

Use Case: ARN extends SR services



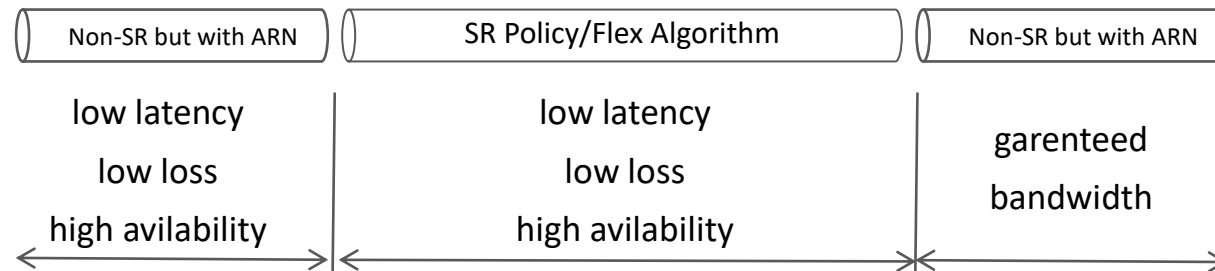
SR is NOT visible



Best effort service ONLY



“ARN” is visible



Differentiated service

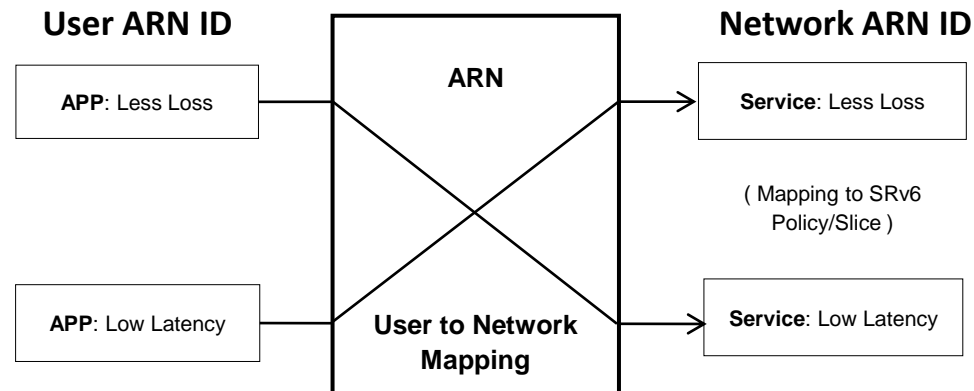


What is ARN(Application Responsive Network)

ARN is network “API” for applications, which makes SR/Slice service “visible” to user.

- is for SR6 and SR MPLS networks.
- is dataplane “color”
- is not global significant,
- is carried in IPv6 DoH/HBH
- can be passed from untrusted to trusted domain

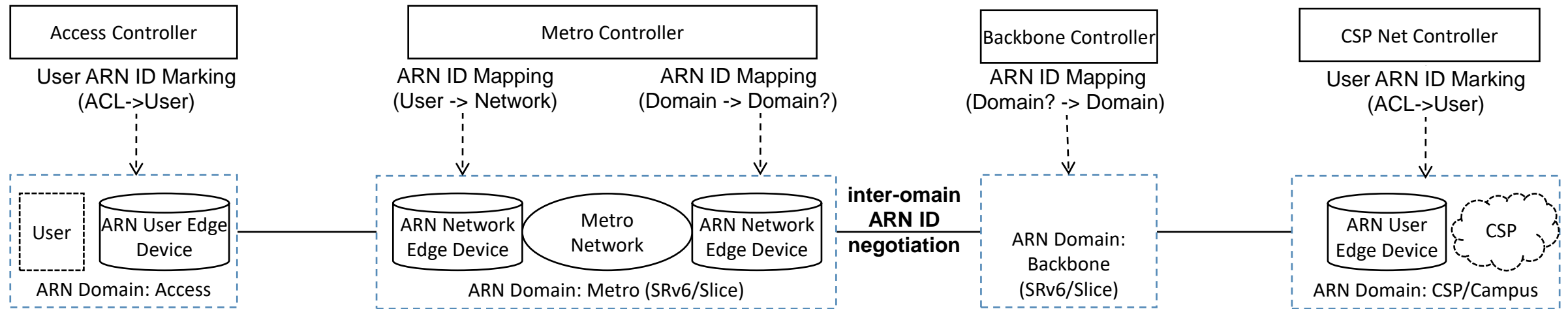
User ARN ID:
representing service
subscribed by user



Network ARN ID*:
representing pre-planned
network service

*Note, network ARN ID may not be visible in packet because it can be translated into SR policy or slice. Slice is defined by Flex-Algorithm (rfc9350). Here SR includes both SRv6 and SR MPLS.

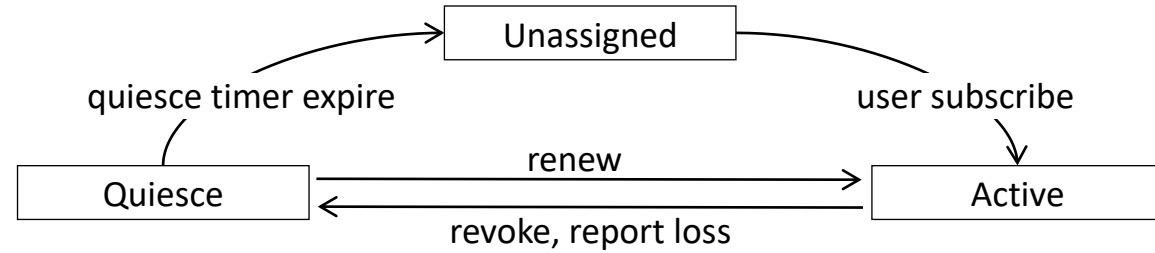
ARN ID Architecture



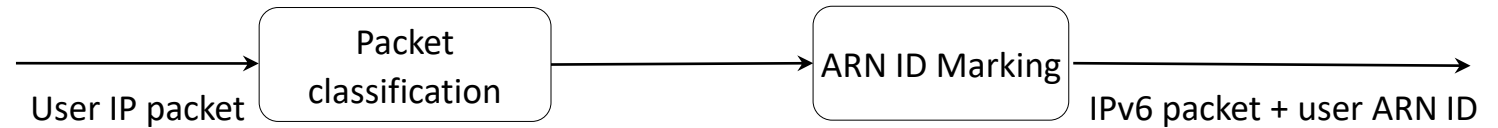
- Intra-domain ARN ID assignment:
 - Metro & Backbone: “Network ARN ID” is assigned to ARN Network Edge Device for each service type, e.g. BGP color or Flex-Algo algorithm
- Inter-Domain ARN negotiation by GRASP:
 - Objective: agreement between the neighbor domains for same service type that user subscribed
 - Negotiation: ARN ID for particular IP destination. If negotiation failed due to there is no corresponding SRv6 Policy or slice, report that to controller for manual fix.

ARN Node Implementation

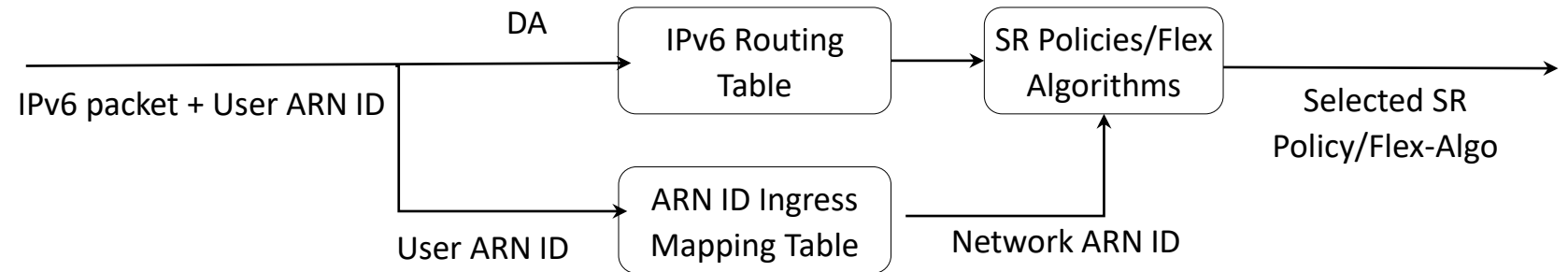
User ARN ID Lifecycle Management



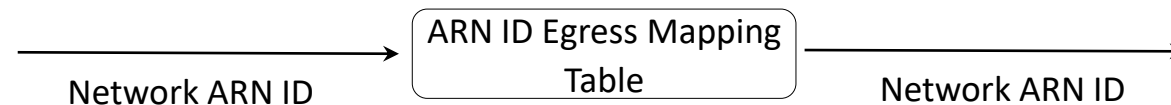
ARN User Edge Device



ARN Network Edge Device (ingress)



ARN Network Edge Device (egress)

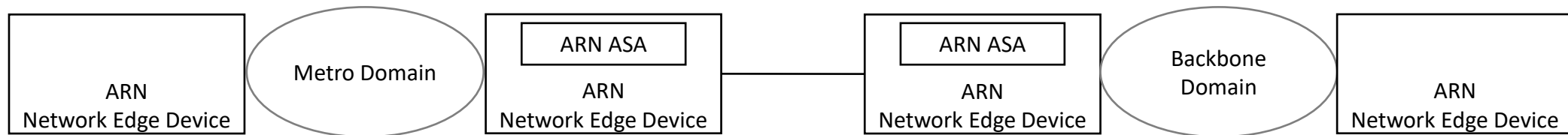


ARN ID negotiation

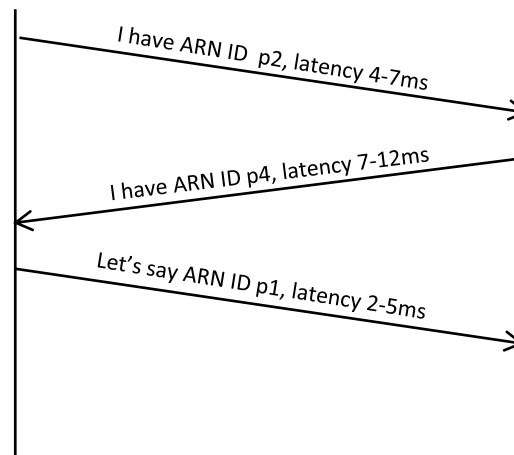
Problem: Inter-domain ARN ID alignment sometimes is really tricky, e.g. e2e latency constraint.

Solution: Leverage GRASP between ARN Edge Devices to find an optimized solution

Example: Please find a cross domain path with latency less than 17ms



candidate path latency:
p1: 2-5ms; p2: 4-7ms



candidate path latency:
p3: 6-9ms; p4: 7-12ms

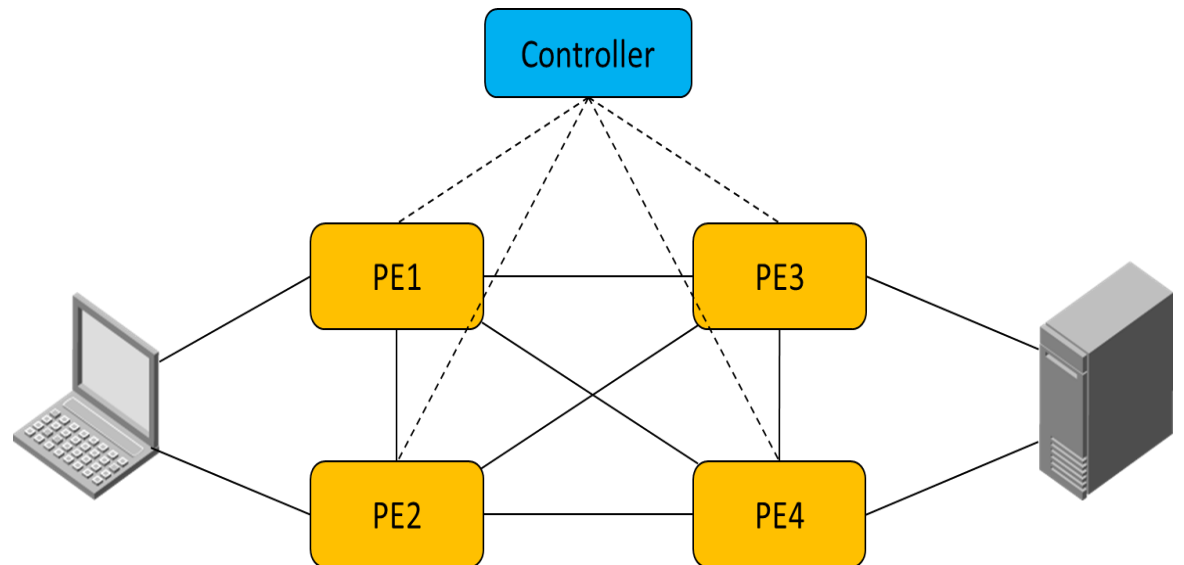
generate ARN ID mapping
entry: p1->p4

Running Code

Lab Interop-test Status (not support inter-domain operation)

Hardware devices and software implementations that will participate in ARN interoperability tests hosted by China Mobile in August 2024:

- China Unitech's Unified Controller
- Huawei NE40E
- H3C CR16010H-FA
- ZTE M6000-8S Plus and M6000-3S
- Ruijie RG-N8010-R



Next Steps

- Any questions or comments are Welcomed
- Seeking for feedback