Interutility MPLS

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Background part 1

- Traditionally, these functions have needed to be interchanged:
  - Relaying
  - SCADA
  - MW/MVAR Telemetry
  - Automatic ringdowns
  - PBX trunk lines
- Circuit types for above interchanged functions have been:
  - 4 Wire E&M analog
  - 2 Wire analog
  - RS-232
  - IEEE C37.94
  - DS1
  - SONET/SDH

Background part 2

All types of circuits could be a direct interface hand off, such as through a wall or between buildings, or nested, e.g., a DS0 in a DS1 or a DS1 in an OC-3

None of these methods are good at packet based services or packet based transport

None of the methods support redundancy very well without complications

Goals

- Hand off circuits/services with the best possible cyber secure manner
  - No network topology information exchanged (i.e., routing protocols)
  - No interior to utility node IP addresses exchanged (far-end IP addresses)
  - Bare minimum of protocols needing to run on handoff link(s) (ideally just one, max)
  - Ability to put firewall/IPS/IDS inline with the link(s)
- Support standards-based hand offs
  - Standards based protocols can be more easily inspected by security devices
    - Segment Routing and Binding SID (RFC 8402), possible BGP (RFC 4271)
  - Including standards based encapsulated services – e.g., C37.94 via RFC 5086
- Support wavelength based leased services for interutility handoffs
- Reduce reliance on TDM technologies, at least at the handoff locations
- Support better redundancy and resilience of handoffs

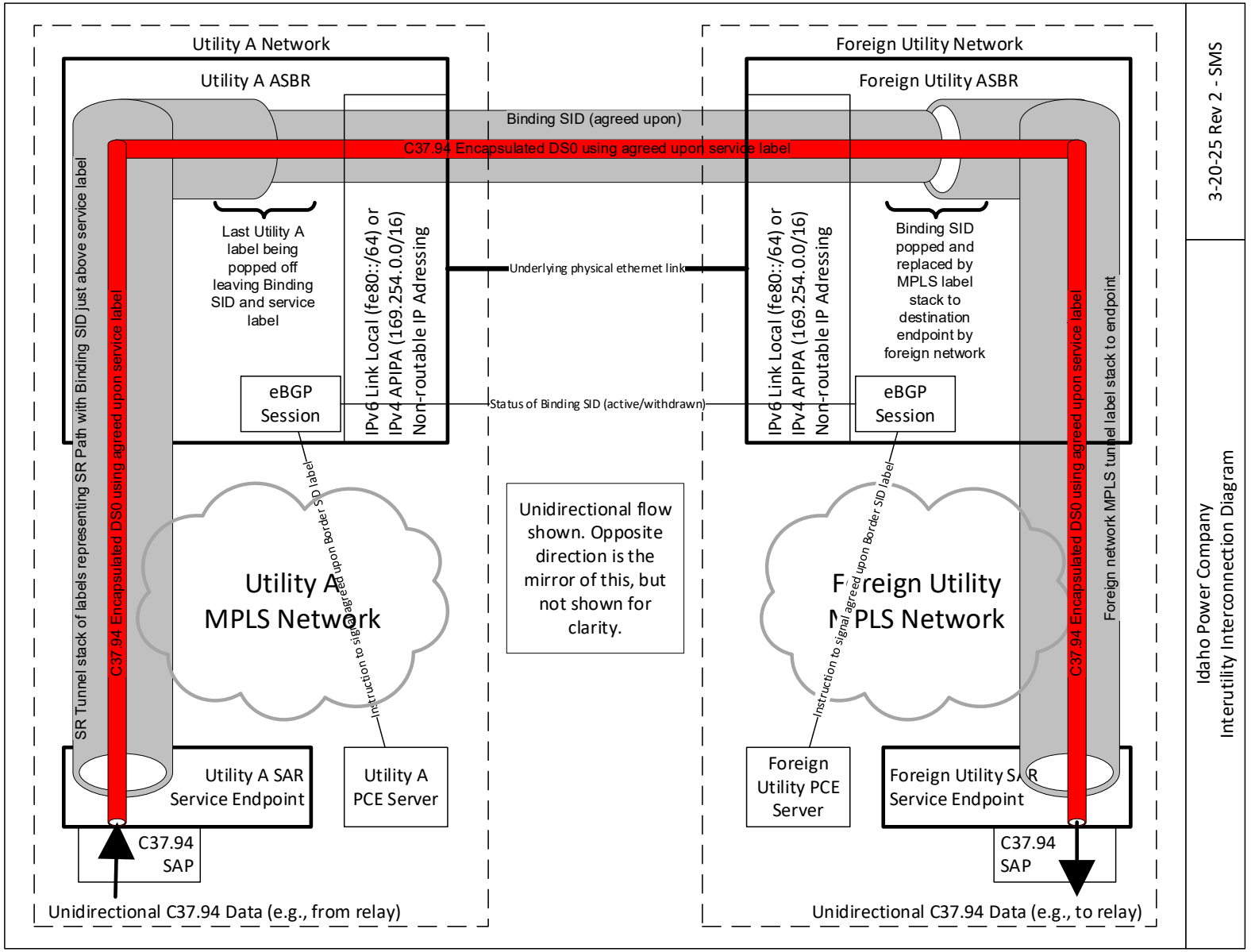
Hurdles

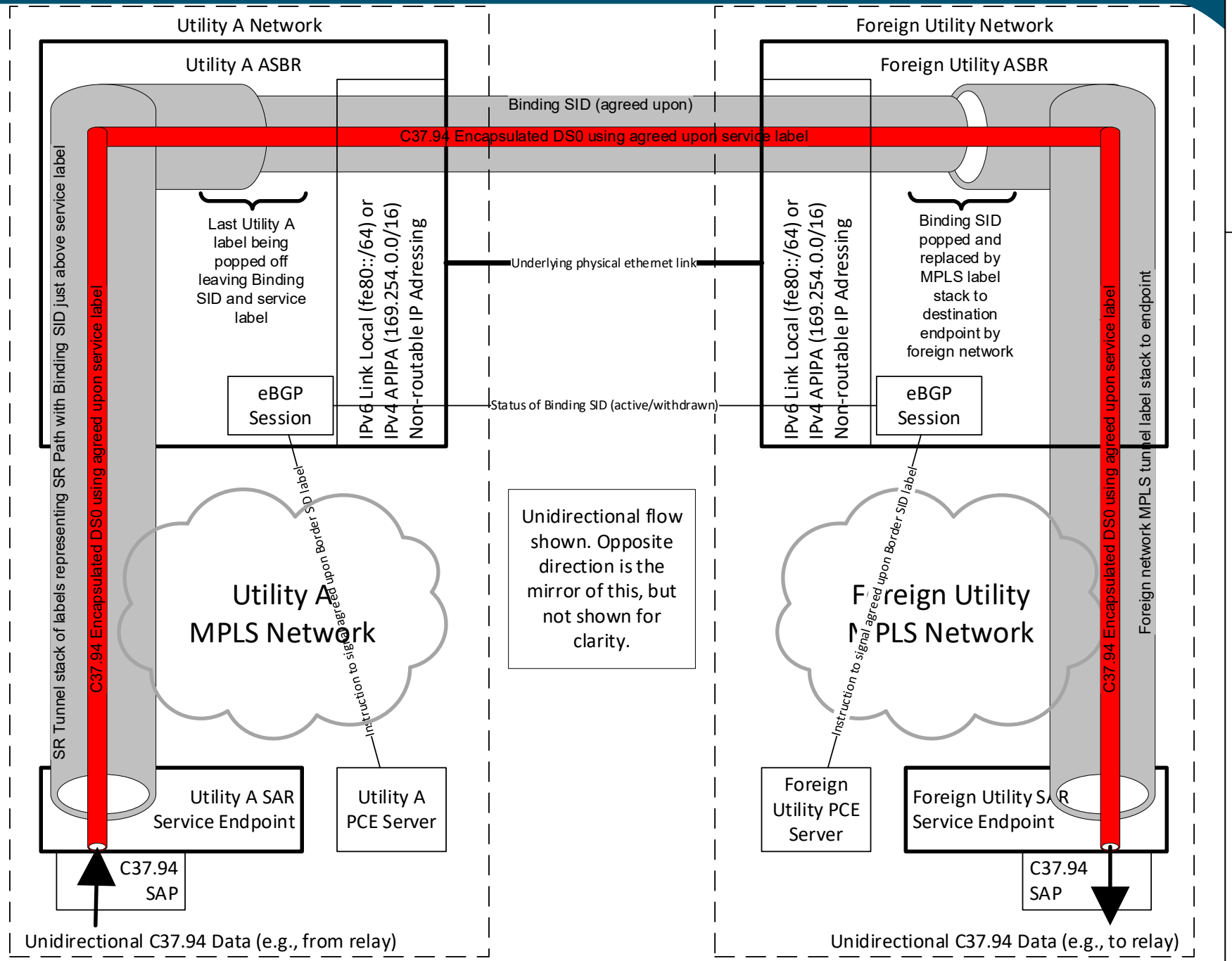
- Inter-entity circuit/service handoffs regularly occur today, but they are done between telecommunications carriers using global unique node addresses and an assumption that the services will be delivered between node IPs that are known to each entity.
  - This goes directly against the cyber secure goal
  - Most utilities use RFC1918 addressing for system IPs in their networks leading to potential IP addressing conflicts
- Support from manufacturers to change the status quo of only the above model
- Firewall/IPS/IDS being able to interpret and understand traffic types being handed off
  - Layer 2 operation is likely needed. This is supported by some equipment today.

An abstraction approach

- Use MPLS Segment Routing (SR)
  - The key element is the Binding SID for a tunnel between a pair of sites. The Binding SID would a label utilities agree upon in advance and is static
- Link between utilities use non-routable IPs
  - IPv6 Link Local addressing
  - IPv4 APIPA addressing
- Link between utilities would run just eBGP
  - eBGP can signal if service is live or dead (advertise label or nothing)
  - Can allow for redundant operations
  - May be possible to not use???
- Services would ride the between utilities inside the Binding SID using agreed upon in advance service labels
- A PCE may or may not be needed

- ***Agreed upon tunnel and service labels are functionally no different than TDM timeslots***





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Idaho Power Company
Interutility Interconnection Diagram

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Questions? Feedback?

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