Prefix Unreachable Announcement

draft-wang-lsr-prefix-unreachable-annoucement-04

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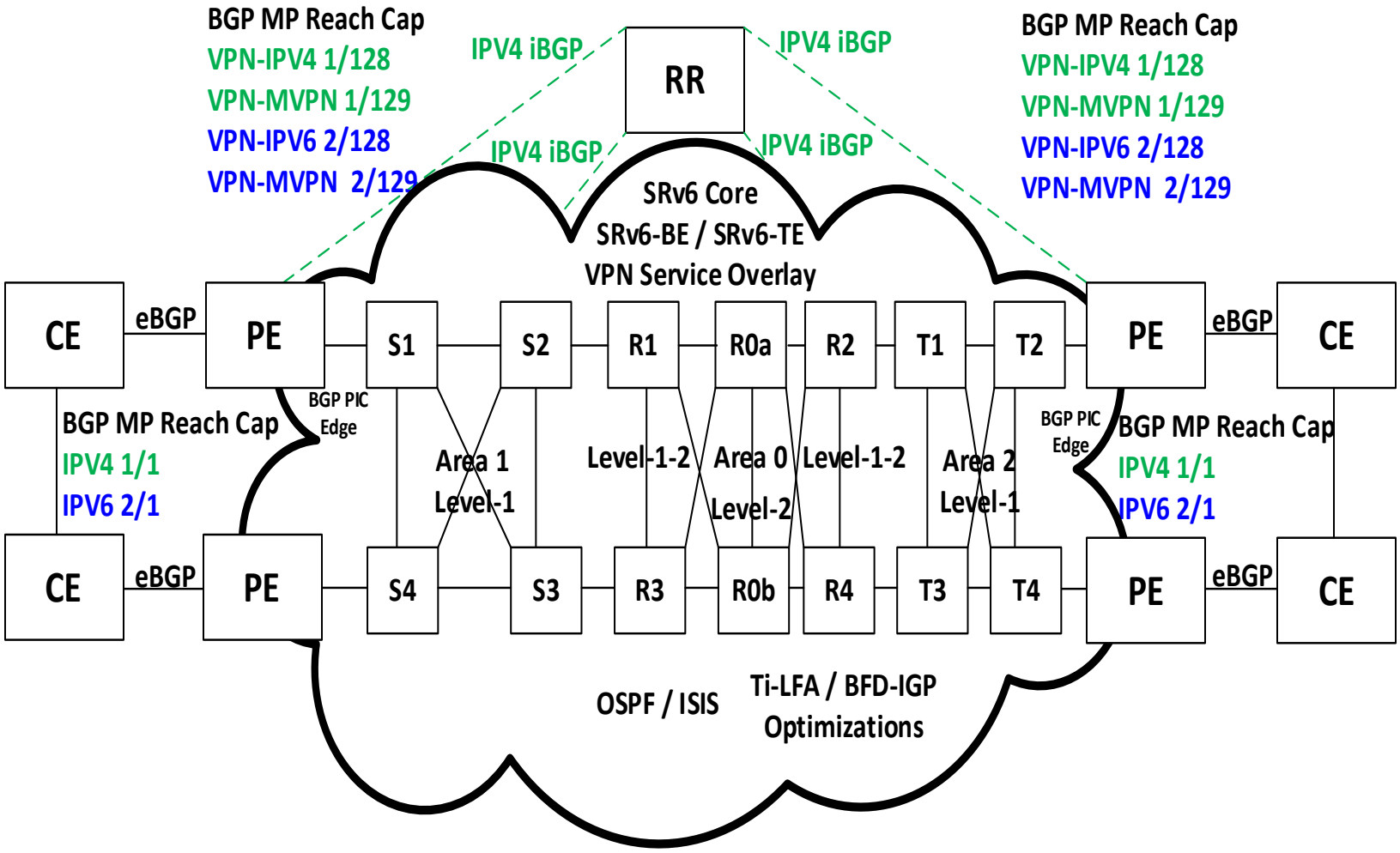
IETF-109, November 2020

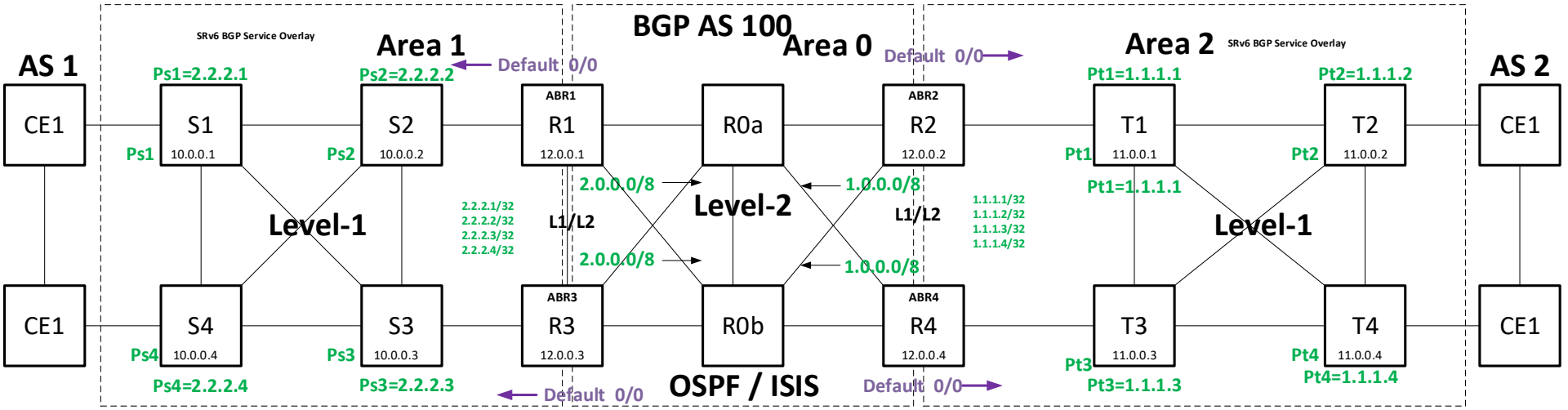
Motivation & Problem Statement

- The motivation behind this draft is related to SRv6 IPv6 data plane based on our traditional unicast routing (uRIB) Longest Prefix Match (LPM) forwarding plane, where the IGP domain has been carved up into OSPF or ISIS areas & summarization is utilized. In this scenario failure conditions result in black hole of traffic where multiple ABRs exist and area partition or other link or node failures occur resulting false positive or negative summarization where no component prefixes actually exist.
- Summarization of Inter-Area types routes propagated into the backbone area for flood reduction are made up of component prefixes. It is these component prefixes that the “Prefix Unreachability Announcement” tracks to ensure that aggregation of flows are not routed to a border node and dropped, and instead are dropped at the receiver endpoint trying to reach service source prefix. PUA also ensures instant convergence with ABR FRR switchover when area is partitioned or ABR has services down to avoid black hole of traffic.
- The goal of this draft is to provide a signaling mechanism within the IGP to be able detect BGP next hop failure for vpn service overlay, underlay link or node failures or SFC service VIP failures that are “down” to the source entity requesting service, so the flow is terminated at the source endpoint. Thereby eliminating aggregation of flows hitting the border nodes as well as ensures Primary to Secondary ABR failover occurs immediately via PUA signaling & detection mechanism in area partition or other false positive or negative situations to quickly converge the data plane onto the Secondary ABR taking over summarization in an ABR switchover condition.

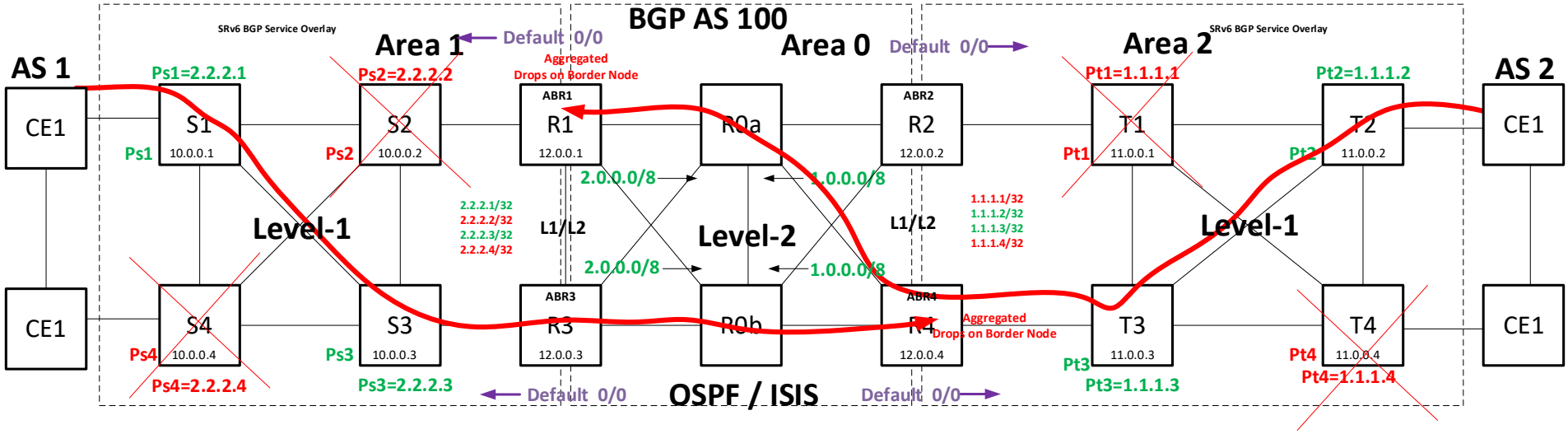
SRv6 ISIS / OSPF Multi Area / Level Service Provider Core Topology
SRv6-BE / SRv6 TE w/ VPN Overlay Services



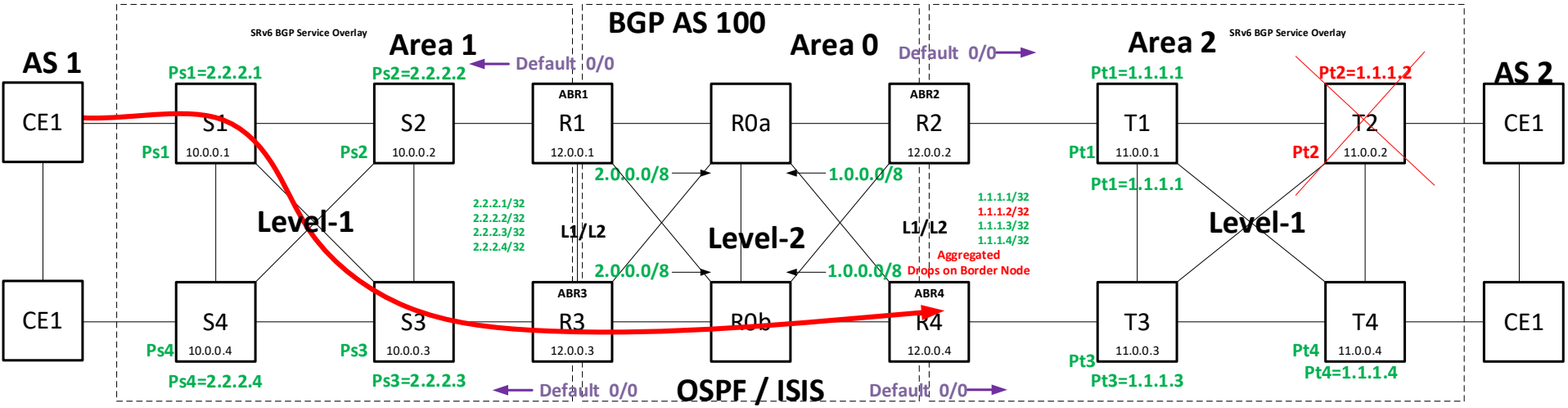
SRv6 - IGP Domain Topology
SRv6-BE / SRv6-TE



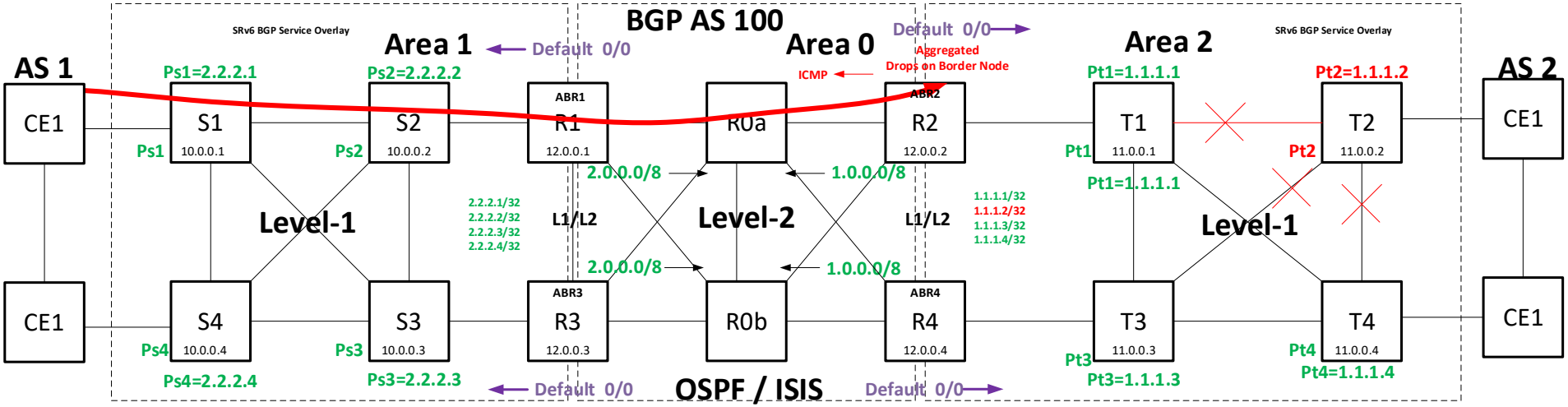
SRv6-BE / SRv6-TE
Problem Statement



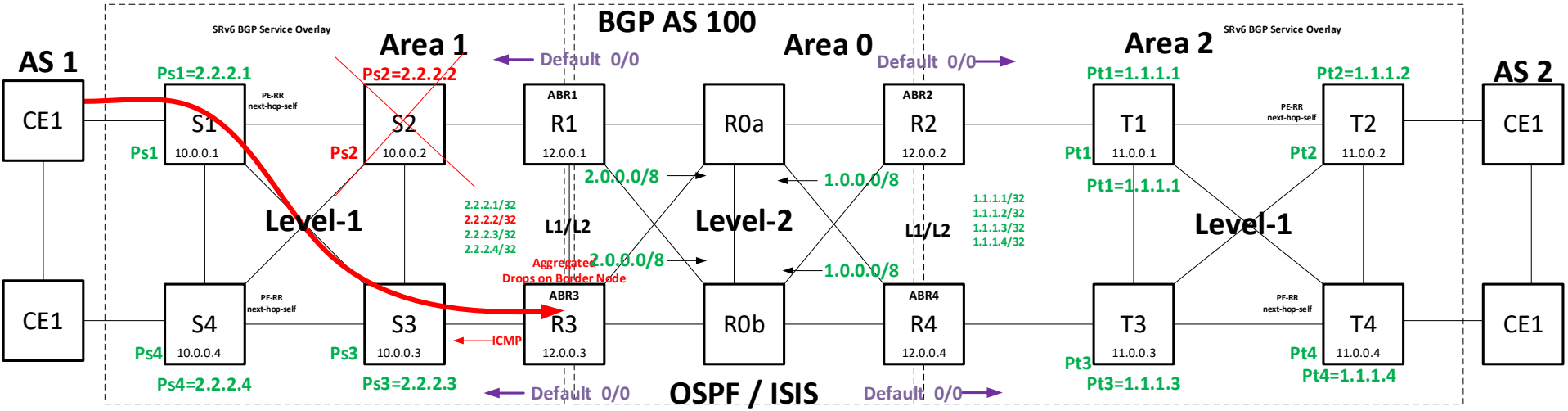
SRv6-BE / SRv6-TE
Inter Area Node Failure – Node T2 down



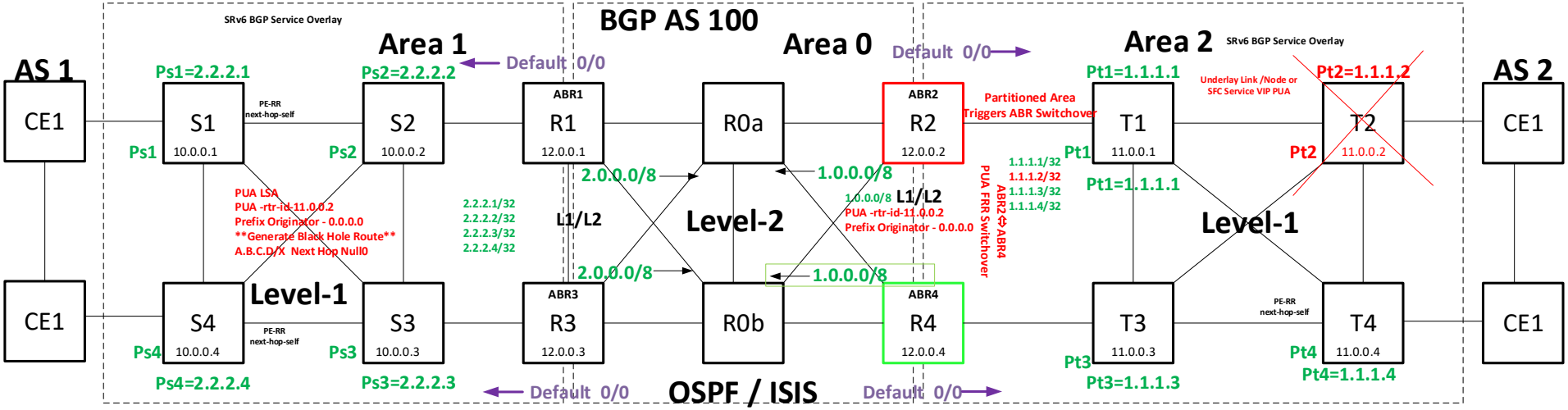
SRv6-BE / SRv6-TE
Inter Area Link Failures



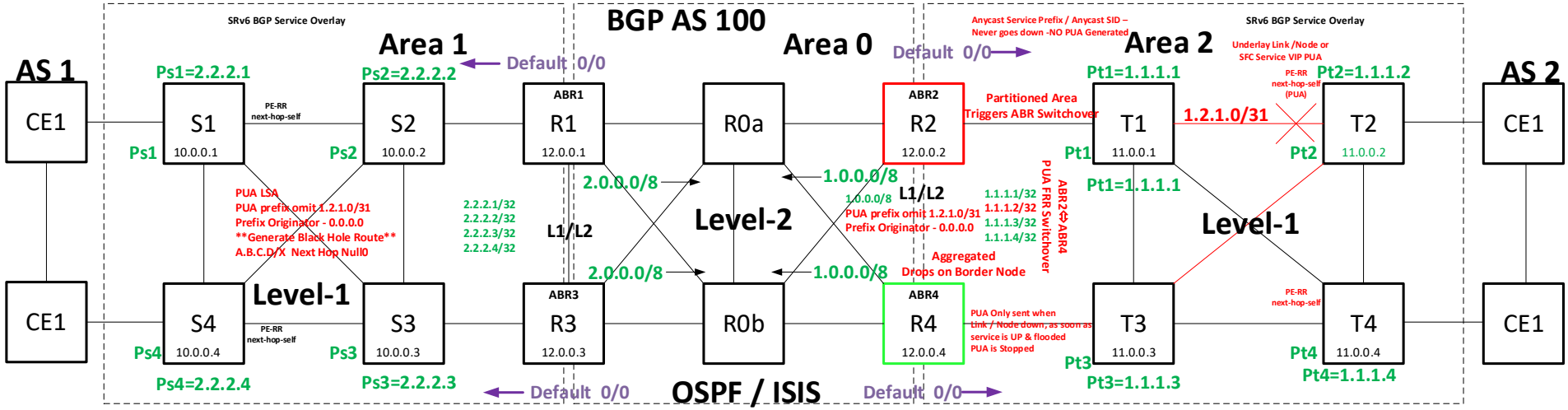
SRv6-BE / SRv6-TE
Intra Area Node Failure



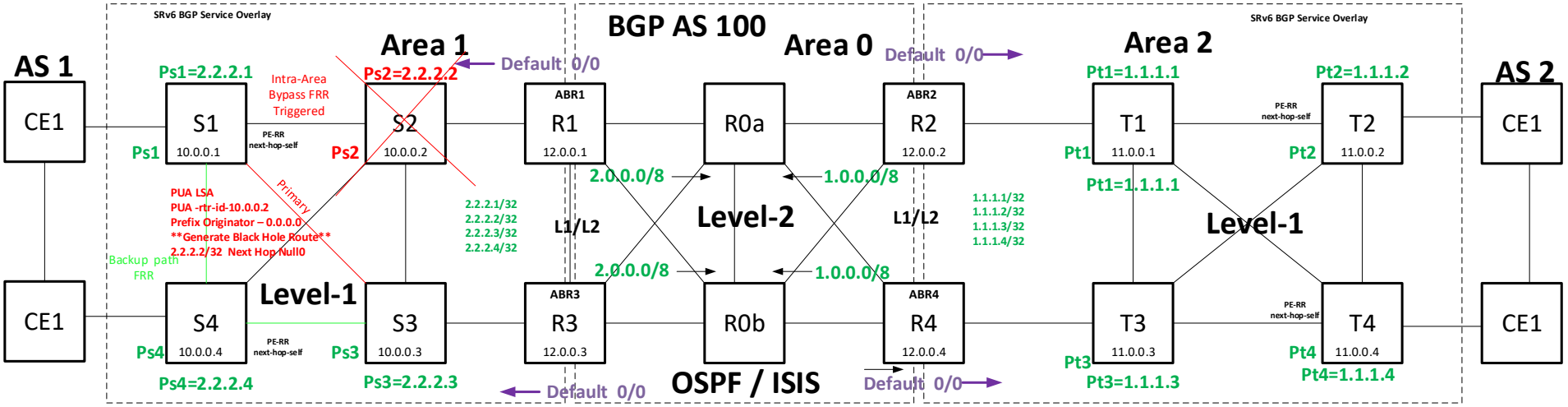
SRv6-BE / SRv6-TE
Inter Area Node Failure – Node T2 down –
PUA Solution



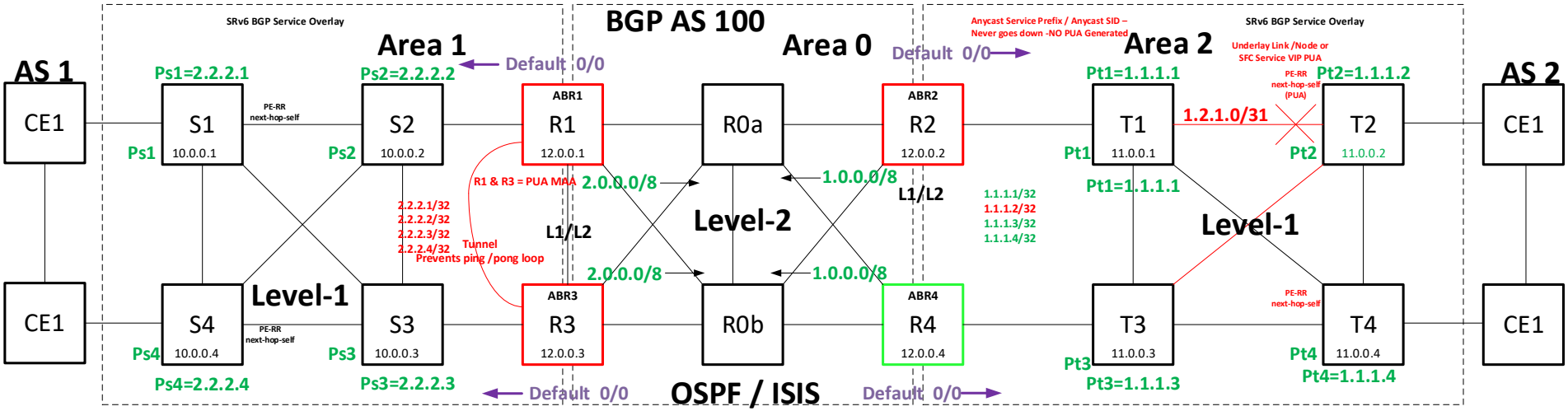
SRv6-BE / SRv6-TE
Inter Area Link Failure – PUA Solution



SRv6-BE / SRv6-TE
Intra-Area Node Failure PUA Solution



SRv6-BE / SRv6-TE
MAA – Maximum Address Announcement



MAA Rule – Controls when summary should be sent & if hit a threshold of when most component routes are down then don't send summary
This adds additional criteria to the conditional summary generation.
PUA < MAA - Advertise Summary
Components < MAA - Don't advertise summary
Components + PUA > MAA – advertise summary
In a worst case scenario where most all component routes are "down", the summary is stopped and only longer prefix match component prefixes are advertised.