

# Detailed description and Diagrams

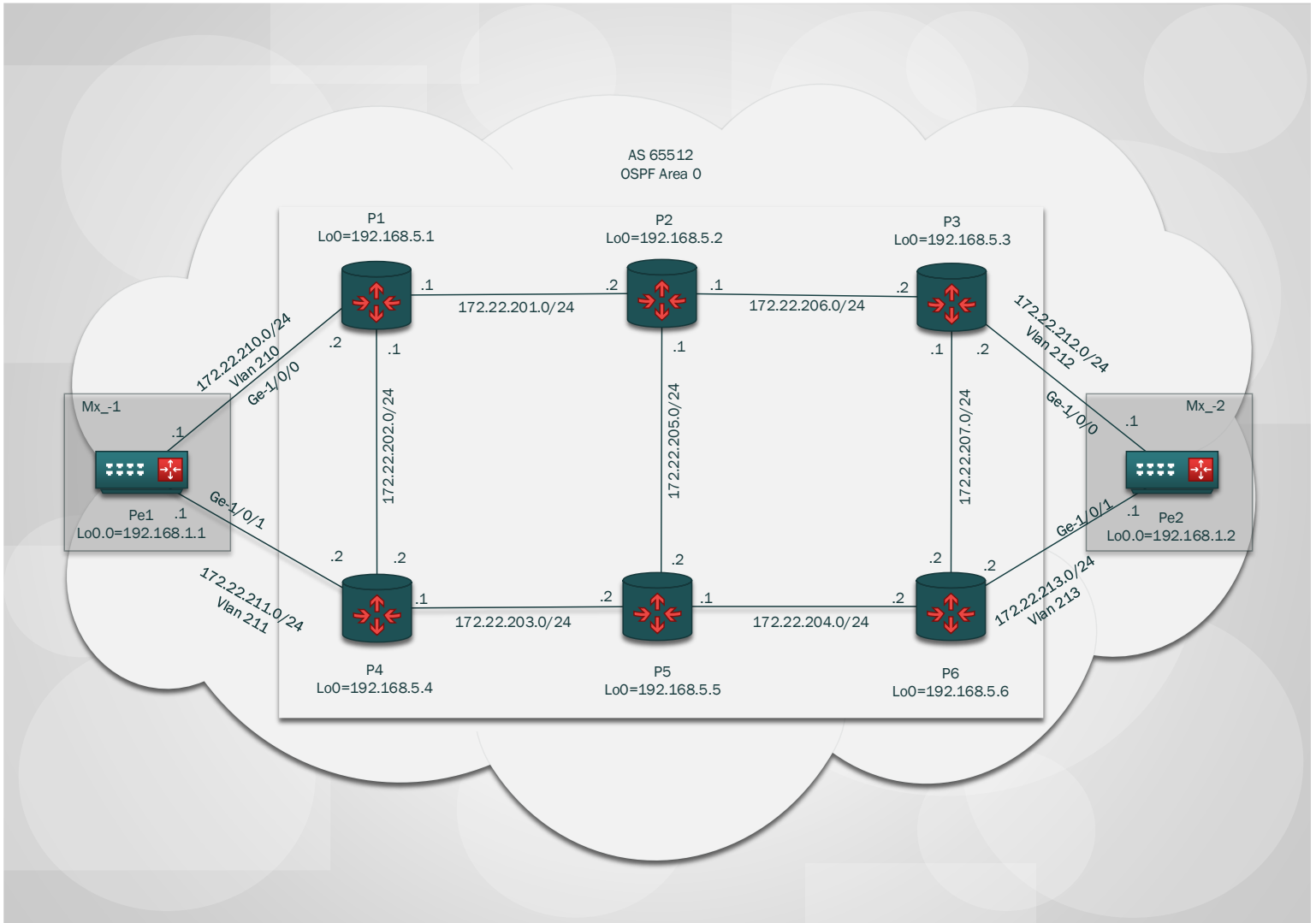
MPLS-VPN Assessment Part 1 – Design and Planning

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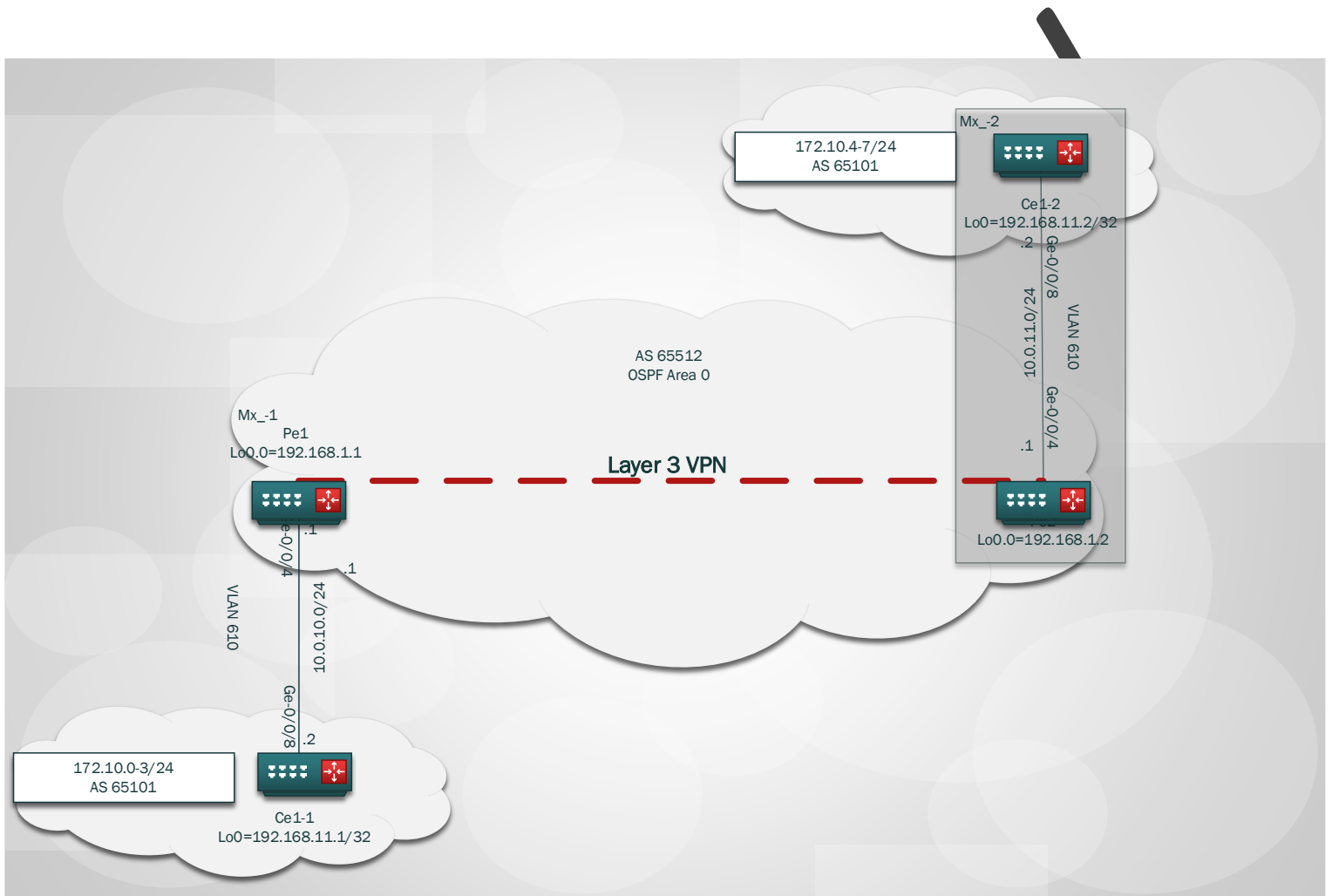
**Daniel Cortez**

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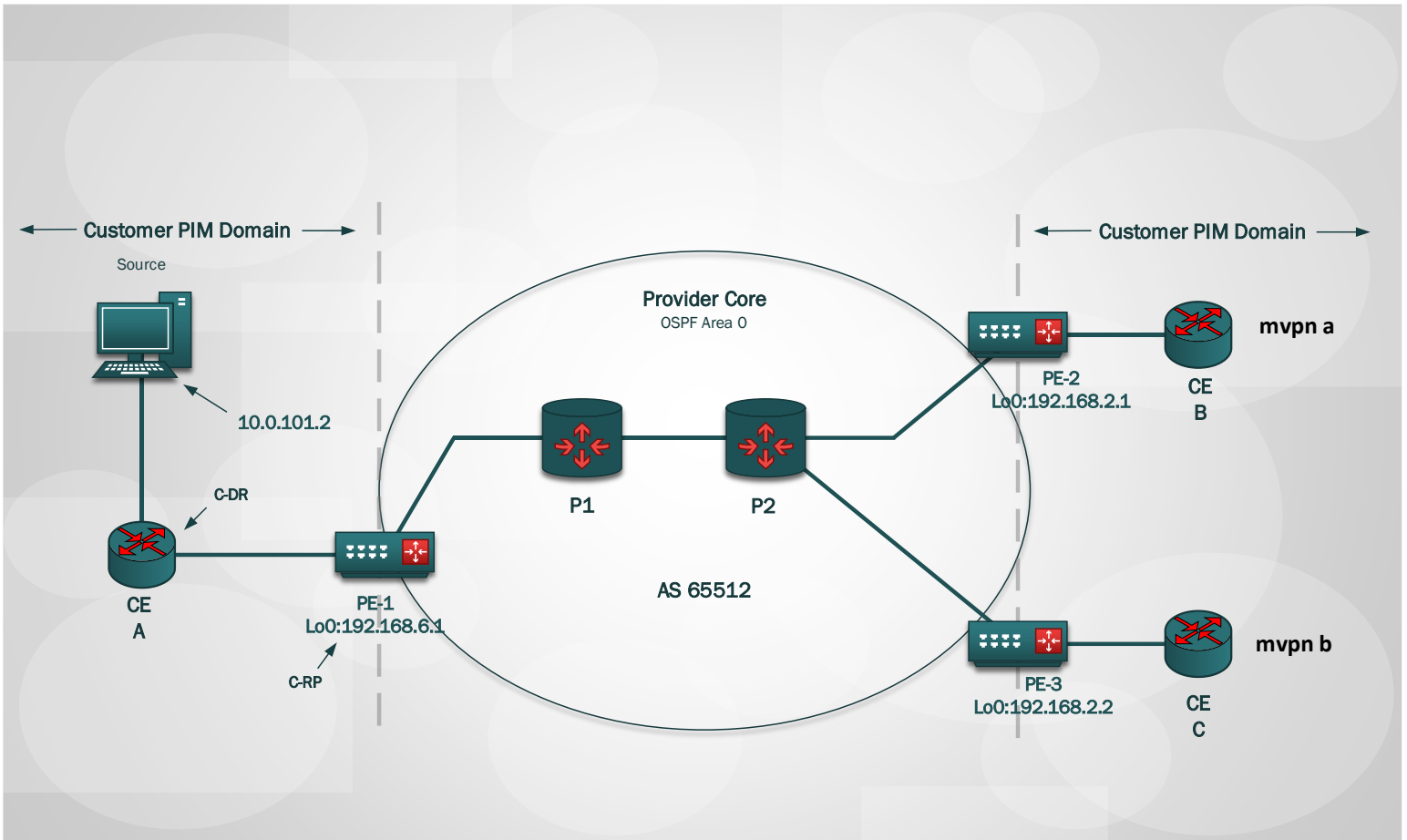
# Task 1: Diagram of a baseline layer 3 MPLS VPN network



## Task 2: Diagram of a layer 3 MPLS VPN network that shows the connectivity between the Provider Edge router and the Customer Edge router



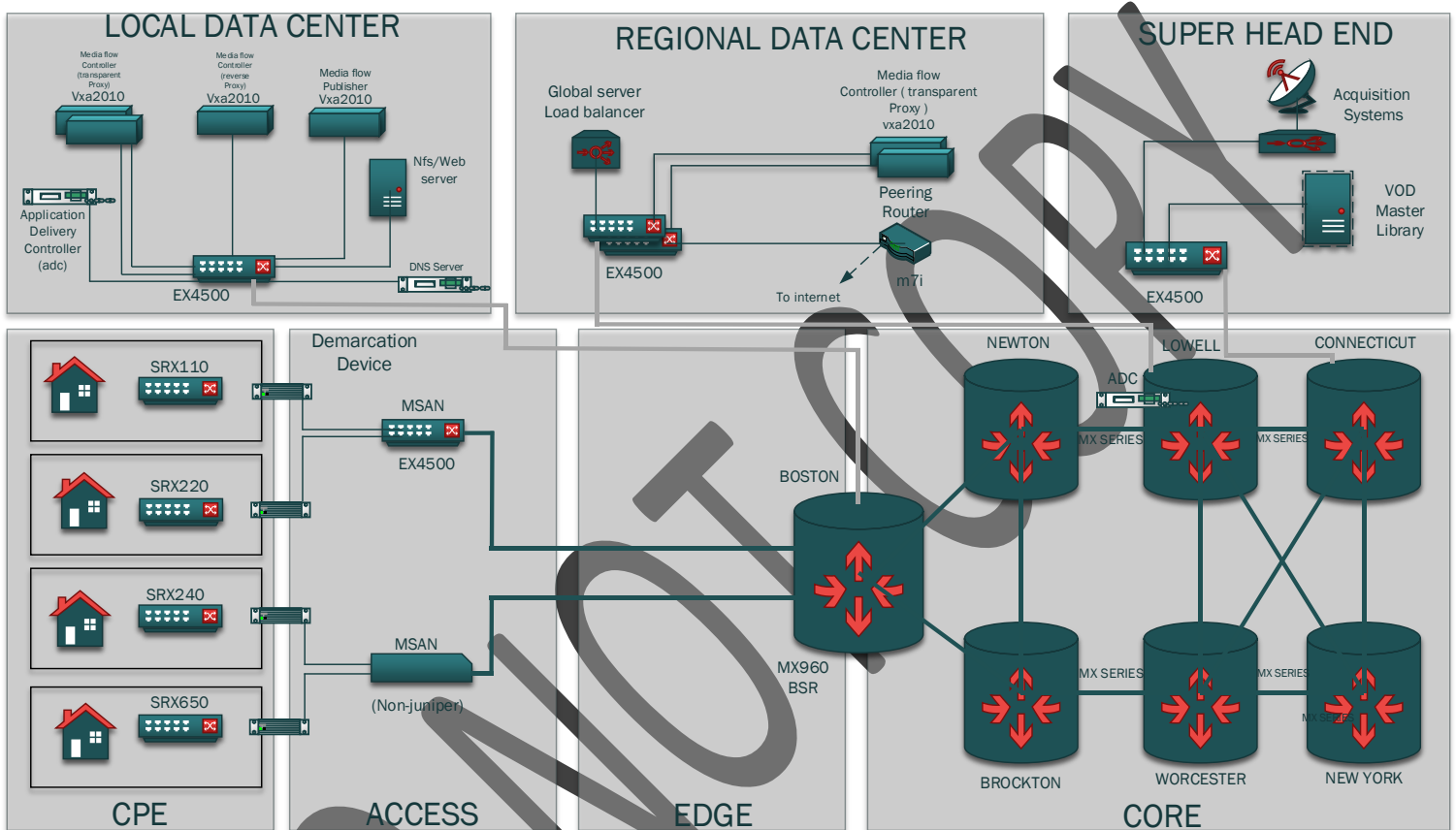
**Task 3: Diagram of a Multicast MPLS network that would be suitable for IPTV distribution.**



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# Task 4 (3 pages) Functional diagram of an IPTV network showing network architecture from the IPTV standards bodies.

## Page 1: IPTV network showing network architecture



This figure summarizes the typical network architecture and depicts the validated network. The ensuing chapters detail each portion of the network.

The Wan consists of the following domains:

- . Core network, which is a multicast-enabled MPLS backbone network.
- . The BSRs are MX Series routers that support subscriber management services.
- . Access equipment, which includes DSLAMs to support xDSL users, as well as an EX Series Ethernet Switches that support Ethernet-attached subscribers. This network does not include aggregation switches.

. Tiered data centers also represent part of the entire network architecture:

- **Super Head End (SHE) data center**, which is the centralized storage and download point for many types of content, including linear TV. This site is referred to by a variety of other names, including National Data Center.
- **Regional Data Centers (RDCs)**, which are the primary data centers serving the subscribers. For example, advertisements are inserted into the linear TV stream, and it is this stream that is forwarded to the subscribers. VoIP switches and Internet peering points often reside at this location. This site is also called the Video Hub Office (VHO) or Local Head End (LHE) among other names.
- **Edge data centers**, which primarily consist of aggregation equipment and content caches. These sites also are known as broadband edge (BBE) sites, Video Service Office (VSO) or Central Office (CO).

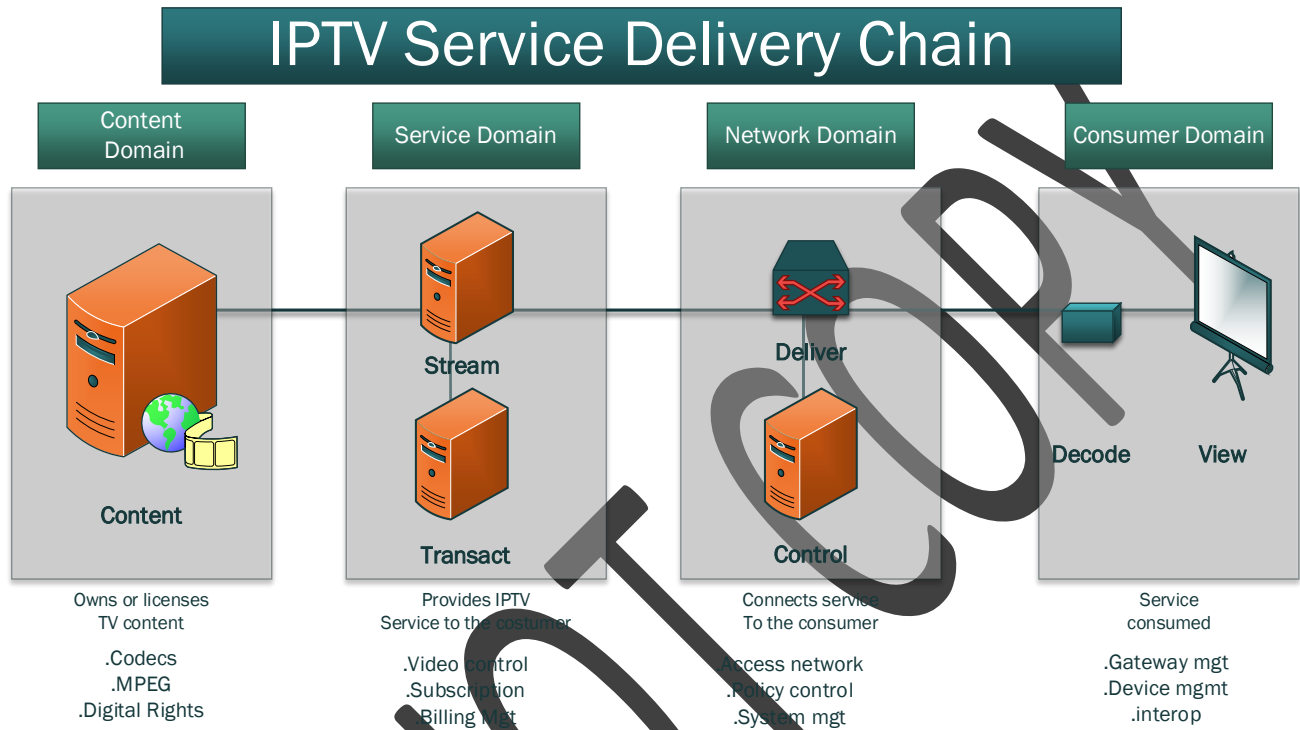
. **Lowell** – This source router connects directly to the regional data center, which is the head-end for most traffic, including linear IPTV, VoD, VoIP and web.

. **Newton** – This transit router does not originate or terminate any traffic

. **Boston** – This edge router is the subscriber's entry point into the core network.

. **Multi-Service Access Node (MSAN)** – This device aggregates together subscriber traffic. A wide range of a devices has been used, including DSLAMs, Passive Optical Network (PON) and Optical Line Terminators (OLTs). The configuration illustrates Juniper Networks EX Series Ethernet Switches aggregating standard Ethernet traffic.

The IPTV Ecosystem

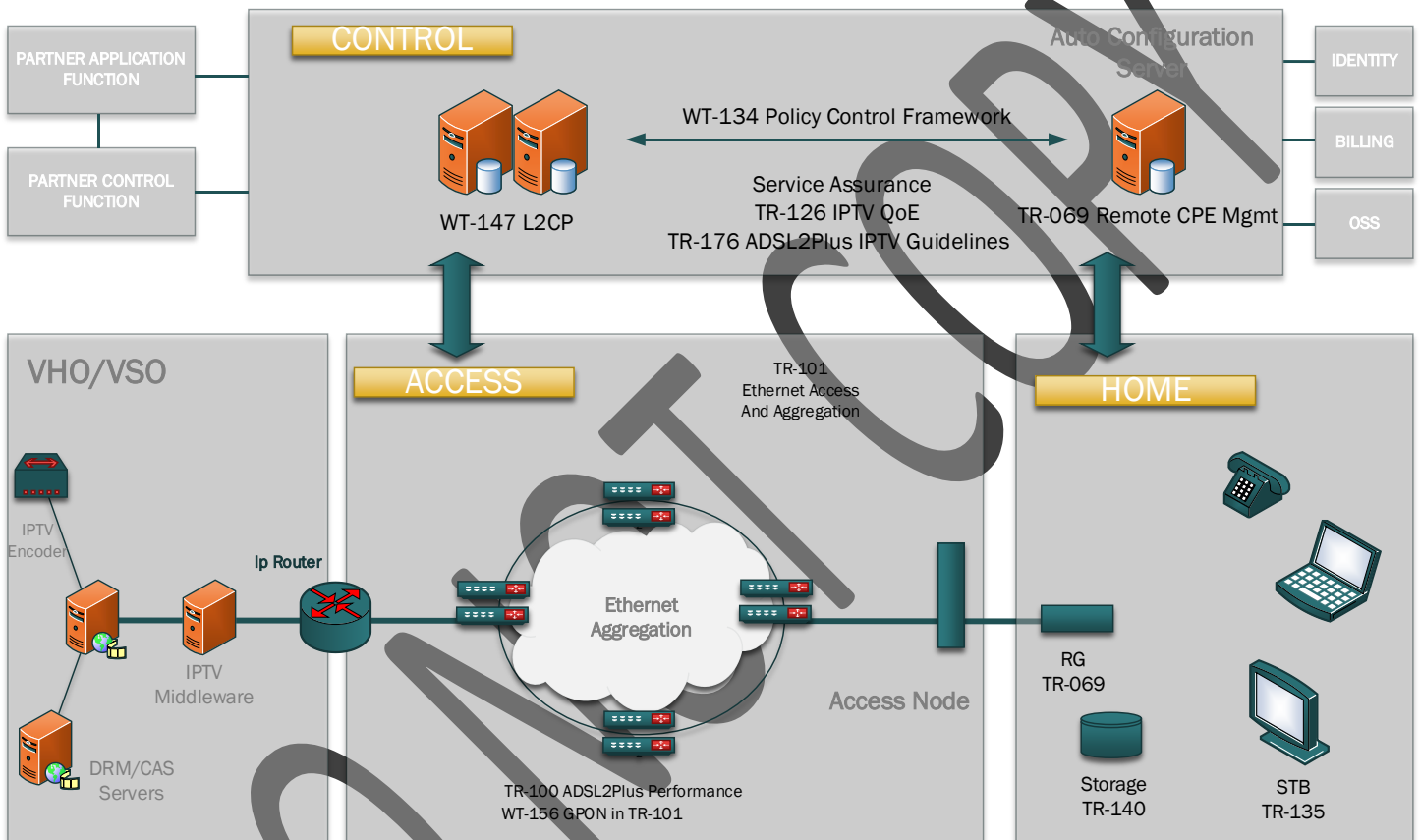


If we step back and look at the big picture, IPTV service deployment entails a complex ecosystem that can be represented in a delivery chain consisting of four domains: Content, Service, Network, and Consumer domains.

Many standards bodies and consortia have been actively working in various areas, with different focuses and in varied capacities. The Broadband Forum focuses on the broadband transport from the core/distribution network to the home. It is most concerned with Network Domain and Consumer Domain, while providing enabling functionalities to the other domains. Many organizations have referenced the Broadband Forum's work as part of the building blocks of the complete architectures.

## Page 3: Broadband forum standard

### Broadbandsuite



The Broadband Forum through its Technical Reports (TRs) and work in progress (WTs) has defined requirements for establishing an optimized network and management platform for IPTV. The work of Broadband Forum addresses specific issues in three network realms: BroadbandAccess, BroadbandControl and BroadbandHome that are necessary if the IPTV user is to experience a superior quality experience beyond what is already provided by existing TV delivery methods.



The Broadband Forum's BroadbandSuite (BBS) extends the concept of traditional end-to-end solutions by developing an access and management platform responsive to devices beyond the customer gateway as well as the distribution network.

This "Plan" is designed to minimize provisioning and maintenance issues for service and application providers who must support vast and growing requirements of new applications and hardware. With BroadbandSuite, components work together seamlessly, delivering a high quality consumer experience vital for driving next-generation voice, video, data and mobile services.

Through its BroadbandSuite, the Broadband Forum is addressing these important requirements to help the industry expedite the rollout and ensure the quality of experience for IPTV. The BroadbandSuite defines a robust architecture that spans from the home to the access and aggregation network and includes an intelligent control plane to orchestrate the successful delivery of IPTV.

These efforts address the following key areas:

**\_ BroadbandAccess:** Defines specifications for broadband "agnostic" access network architectures that deliver inherent quality, scalability, resiliency, and inter-working capabilities that enable services to be delivered via multiple business models.

**\_ BroadbandControl:** Creates an intelligent, programmable control layer that unifies all next generation network assets and empowers service providers to deliver personalized services that enhance the subscriber experience.

**\_ BroadbandHome:** Unifies the home networking environment by establishing a common set of CPE capabilities as well as automating device activation and configuration in order to simplify the service delivery process.

Collectively the BroadbandSuite domains provide an end-to-end transport architecture that gives service providers a solid foundation on which to deliver next-generation services such as IPTV, while reducing operations costs through automated network operations.

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