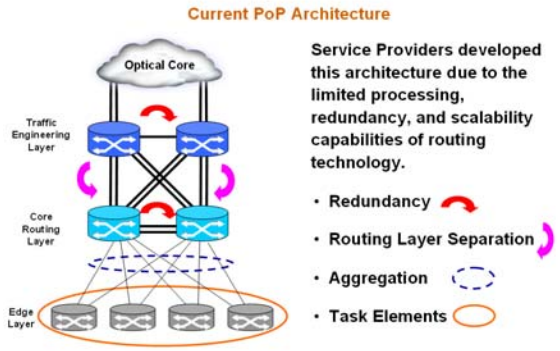
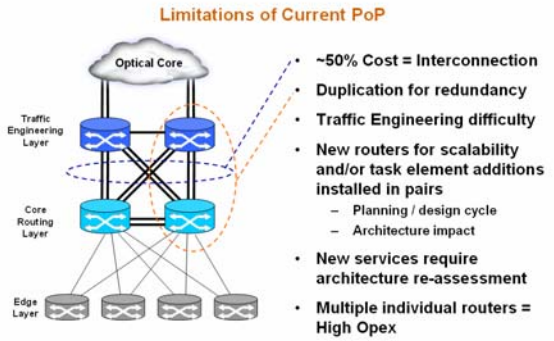
HYPERCHIP
CORE IP SYSTEMS

PBR-1280 Core IP System
Logical Router

Current Points-of-Presence (PoPs) were established based on architectures developed in the early days of the Internet. These architectures allowed service providers to deploy networks using the IP routing and switching equipment available at the time. However, these systems had severe limitations with respect to reliability, forcing network architects to include full system duplication in their designs. Furthermore, due to the lack extensible processing, the segmentation needs within the network (separating core, aggregation/distribution, and edge routing functions) were addressed through layering of equipment. Combined, these issues resulted in an architecture where larger portions of equipment within a PoP are used for intra-PoP interconnections. Service providers use standard interface ports for these interconnections, which typically account for over 50% of the capital and operational cost within the routing environment of the network. This architecture is the primary reason for uncontrolled cost escalation within the network as bandwidth increases.

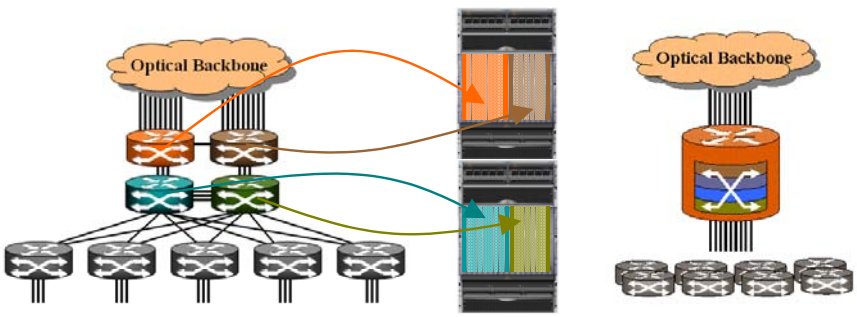




The Logical Router

A Logical Router is the ultimate use of the PBR-1280's unique hardware and software architecture, and addresses the core inefficiency and difficulty in network provisioning and scaling. The Logical Router feature is an extension of the scalable, extensible control plane architecture of the PBR-1280. By combining and allocating resources (line cards, controller cards, and routing instances) within the system via the CLI, the PBR-1280 can simultaneously support the functions of many different network elements (i.e. logical routers), yet have the interconnections between these network elements provided by the PBR-1280's high performance, non-blocking switch fabric. This allows network operators to have the security and operational functionality afforded by today's PoP architectures, without the cost burden of interconnections.

Operationally, each logical router is managed in the same way as the corresponding physical network element in a traditional environment. All of the topologies, securities, and operational aspects of current PoP architectures can be maintained, but at a fraction of the cost.



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Fundamental Features

Routing Domain Partitioning

Network architects frequently partition their network into multiple routing domains. The details differ between networks, but the principle remains. For example, a network may have a "transit core" surrounded by regional ASs. Some routers in a particular location may be members of the transit core while others are members of the regional AS. Interfaces to other networks may be supported via a "peering router." The PBR-1280 can perform each of these roles through the configuration of logical routers within a single system, each linked via a common redundant and scalable switch fabric.

Administrative Partitioning

Each logical routing entity in the PBR-1280 runs a unique EMS/CLI instance, enabling it to be configured, monitored, and managed as a unique entity.

Failure Isolation

The PBR-1280 logical routing implementation provides the same degree of failure isolation as provided by separate physical routers in current network architectures. Individual logical router failures have no effect on other logical routers sharing the same physical router.

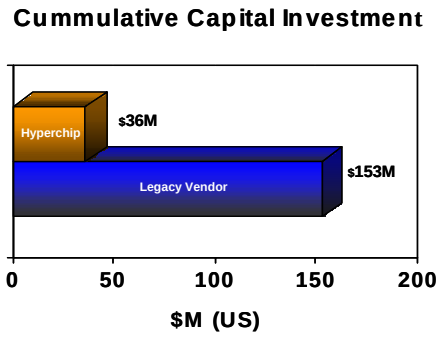
Forwarding Equivalence

The PBR-1280 core IP system offers a new technique to enable any-to-any forwarding on the data plane. FIB Combination (Forwarding Information Base) ensures the packet forwarding performance of each logical routing entity in the PBR-1280 (from physical ingress to egress) is functionally equivalent to that which would occur in the collection of smaller physical routers being emulated by the logical routers. In addition, performance efficiencies are gained through reduced packet processing as logical routing optimizes data plane efficiency via single, rather than multi-hop routing.

Capital and Operational Savings

Because interconnect port spending is typically over 50% of network capital investment within a PoP, the cost benefits of logical routers are tremendous. The operational impact of reducing the number of line cards also allows the number of related personnel (monitoring and provisioning) to be held at reasonable levels with future network growth.

In a study prepared for a major carrier, Hyperchip has shown that even a modest network (7 PoPs, OC48 backbone) with modest growth over a six-year period would demand a cumulative capital investment of over US$153 million dollars on current routing technology for the core. By applying Hyperchip technology, such investment is reduced to under US$36 million – a greater than 4X savings.



The PBR-1280
A New Era in IP Networking

The PBR-1280 core IP system is changing the way architects and planners see the progression of telecommunications. It allows for a carrier-grade approach to data networking, reduces the number of diverse networks, simplifies PoP operations, and allows for cost effective expandability to address planned and unforeseen needs well into the future.

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