Cisco Systems

THE CISCO INTERFACE FLEXIBILITY DESIGN FOR CARRIER ROUTING PORTFOLIO

CISCO INTERFACE FLEXIBILITY (I-FLEX) AND THE CISCO IP NEXT-GENERATION NETWORK SOLUTION

By providing service intelligence, modularity and configuration flexibility with fully compatible shared port adapters (SPAs) and SPA interface processors (SIPs), the Cisco® I-Flex design offers carriers long-term savings and the ability to address service delivery well into the future. Service providers and enterprises worldwide are seeking to reduce capital equipment and operational costs by combining network delivery and operations on a single, all-encompassing IP network capable of provisioning data, voice, video, and mobility services. The Cisco I-Flex design is one more component of the Cisco IP Next-Generation (IP NGN) framework designed to accelerate premium service delivery and extend infrastructure investment. Network convergence is a primary component of the Cisco IP Next-Generation Network, composed of intelligent infrastructure that creates application-aware services delivered by service-aware networks. An intelligent, IP-based network creates new opportunities for offering advanced multimedia services over any type of connection. Moreover, it reduces capital expenditures (CapEx) and operating expenses (OpEx) by providing for multiservice delivery on common infrastructure.

I-FLEX: INTERFACE FLEXIBILITY ACROSS THE CISCO ROUTER PORTFOLIO

With the Cisco IP packet architecture as the foundation for network convergence, proven IP leadership and a companywide commitment to enhanced IP-based solutions, Cisco Systems® is the vendor of choice to partner with service providers and enterprises to provide advancements across network, service and applications layers to facilitate the delivery of high-margin premium offerings.

SERVICE AND NETWORK LAYER INTELLIGENCE

The Cisco IP NGN meets the goals of service providers and enterprise companies by reducing network complexity, offering greater control, and leveraging existing investment across the widest range of services. Traditional services are under intense price pressures and premium services are not immune from competition. Meanwhile, enterprises continue to seek ways to decrease networking costs. Service and infrastructure flexibility are the keys that enable service providers to manage and differentiate their offers. Figure 1 displays the cross-platform interoperability and flexibility of the Cisco I-Flex design.

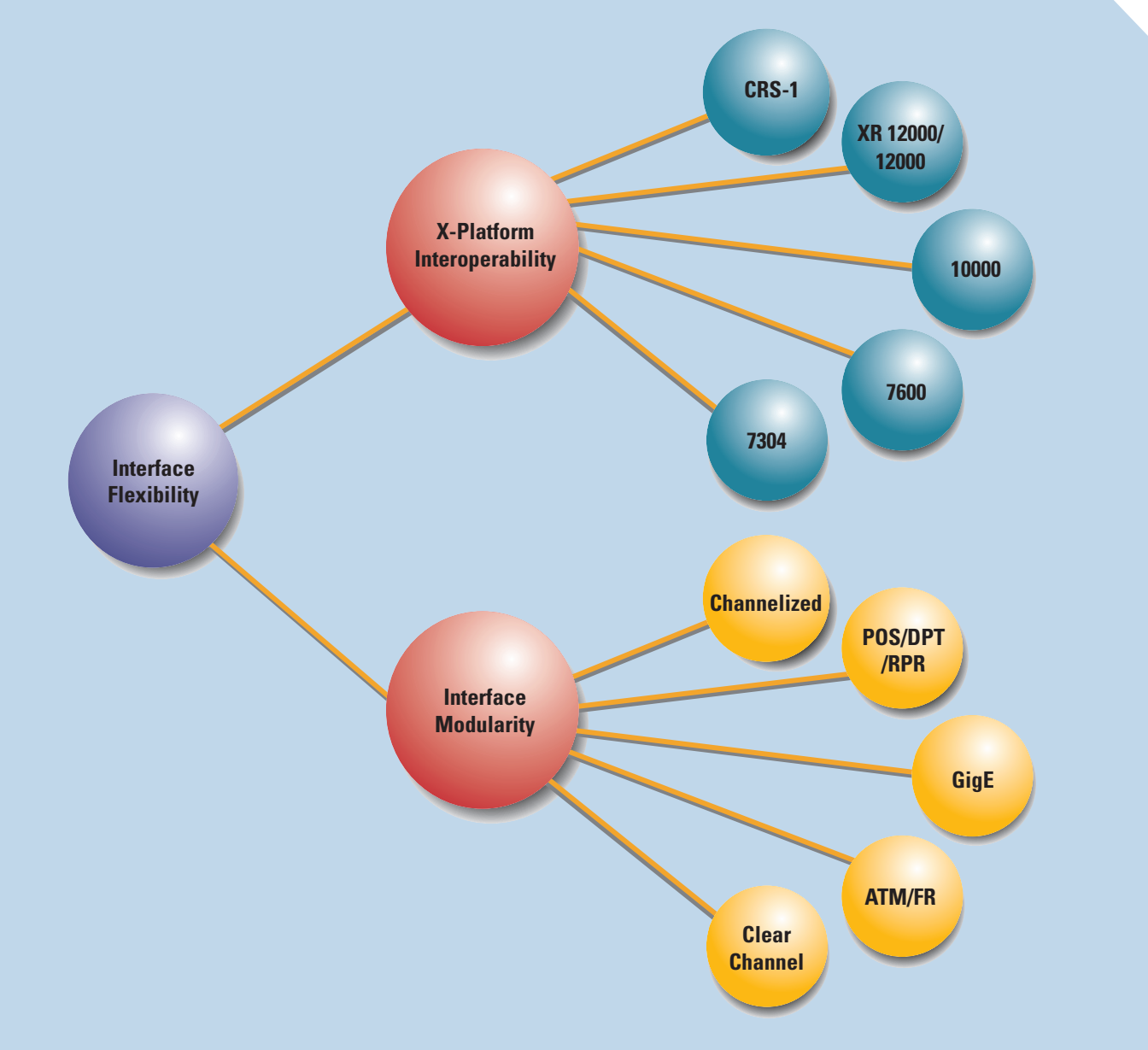


FIGURE 1: I-FLEX IMPROVES SLOT ECONOMICS WITH CROSS PLATFORM INTEROPERABILITY AND INTERFACE MODULARITY

I-FLEX MODULARITY AND FLEXIBILITY

NETWORK CONVERGENCE

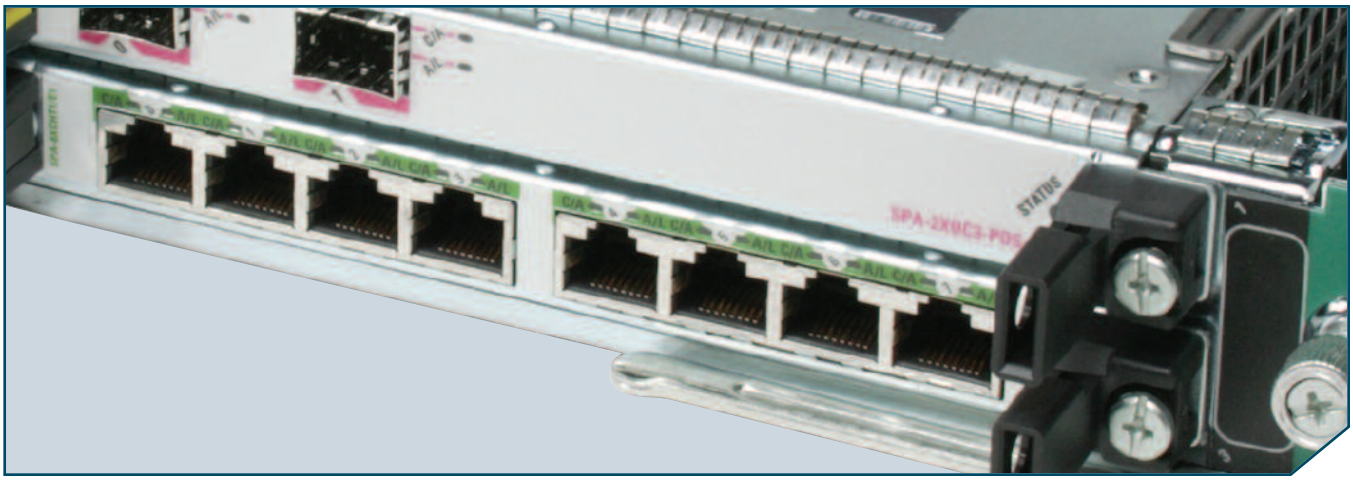
Cross-Platform Interoperability

The Cisco I-Flex design combines fully compatible shared port adapters (SPAs) and SPA interface processors (SIPs) that offer consistent feature support and accelerated service delivery across the Cisco midrange and high-end routing platforms. This includes the Cisco 7304, Cisco 7600, Cisco 10000, Cisco XR 12000 and Cisco 12000 Series Routers as well as the Cisco CRS-1.

The goal of true network convergence is furthered with SPAs and SIPs offering interfaces from copper T1/E1 to optical 10 Gbps and densities of up to ten optical ports per SPA and up to six SPAs per slot. SPAs are easily moved from one platform to another. Significant cost reduction results from common sparing and modularity as service needs change or upgrades are required. Taking advantage of a common design also reduces training costs because technicians do not need to be familiar with a multitude of designs and can more effectively troubleshoot problems.

Interface Modularity and Interoperability

True service convergence is achieved because Cisco I-Flex offers a future-proof, modular architecture that allows customers to mix and match interface types—OC-3 to OC-192, Gigabit Ethernet, copper, ATM, Frame Relay, etc.—in the same slot and to enable service types such as “triple play”, IP VPNs, IP Security (IPSec), and others on the same interface. Competitive designs require many types of interface processor cards that are compatible only with a subsegment of available port adapters. Mixing and matching cards across platforms requires additional investment and spiraling CapEx in an attempt to retain interoperability. Cisco I-Flex, however, can add new interfaces as required. The result lowers initial interface costs, and a SPA purchased for one Cisco platform can easily be used on another as networks are reconfigured and upgraded. Cross-platform compatibility and interface modularity results in a pay-as-you-grow model, where service providers and enterprises can reuse interfaces across the entire product line, thereby protecting their investments and lowering the overall cost of ownership.



I-FLEX INTELLIGENCE

Service Intelligence and Programmability

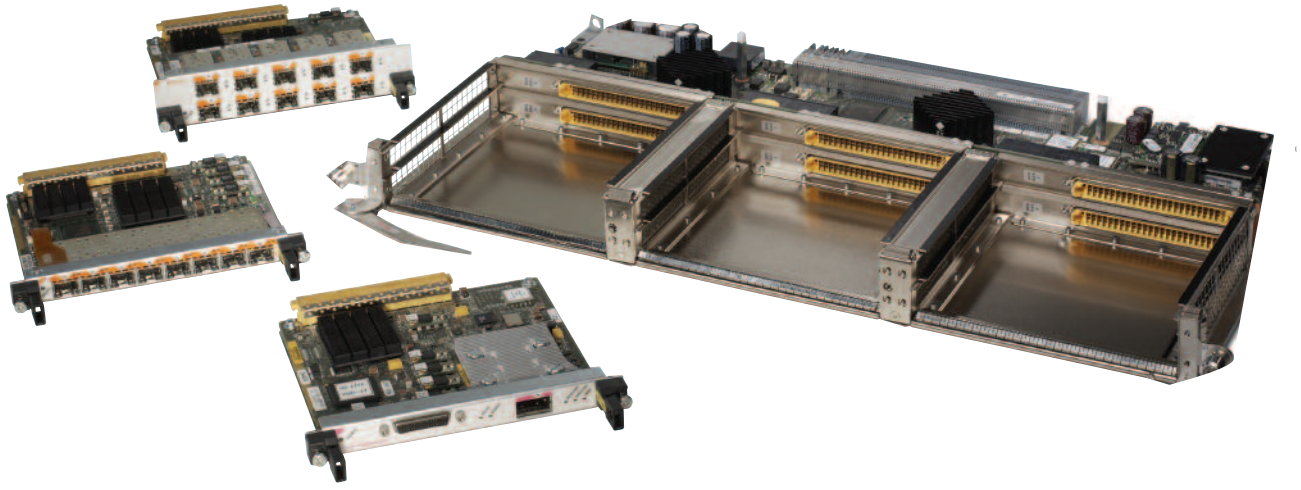
The Cisco I-Flex design is one of a series of product innovations targeted to fulfill the Cisco IP NGN vision of enabling *"triple play" on the move*—data, voice, video, and mobility services. As service providers look to create differentiable premium services using a converged network, they need to offer service-level agreements (SLAs) that guarantee uptime, quality of service (QoS), class of service (CoS), and a certain level of bandwidth. To meet subscribers' expectations, providers must deploy advanced QoS features on the network. The Cisco I-Flex design infuses service intelligence into its SPAs and SIPs, creating extensible, flexible and intelligent interface processors that help increase the overall speed-to-service deployment, thereby accelerating revenue recognition and cost reduction.

With embedded service intelligence, the Cisco I-Flex design helps enable service convergence by offering the requisite QoS, CoS, and security features for deploying data, voice, and video services onto a single interface processor. The unique and extensible Cisco I-Flex hardware architecture incorporates advanced memory management that offers high-speed pattern matching and appropriates memory for process-intensive services. By embedding advanced queuing algorithms in firmware, performance can be accelerated to offer line-rate security, CoS, and QoS features without additional processors and overhead.

Shortfalls in Traditional Architectures

Traditional port adapters and interface processors have inherent design limitations in memory management and packet pattern matching. Lacking programmability and appropriated memory, these cards cannot be optimized for multiservice delivery. Instead they must be preconfigured for each individual service, resulting in a need to support a multitude of individual cards that consume available slots. Moreover, additional processors are needed to guarantee QoS, CoS, and security necessary to support today's most popular revenue-generating services. Slot consumption that results from requiring superfluous cards decreases slot density and worsens overall slot economics. The Cisco I-Flex design offers greater configuration flexibility.

PAY AS YOU GROW MODULARITY



All SPAS are multiplatform compatible with common SIP design.

I-FLEX INTELLIGENCE

Technical Leadership Helps Enable Network and Service Convergence

INDIVIDUAL SERVICE OPTIMIZATION

Inherent in the Cisco I-Flex design is the ability to program individual SIPs for different services. Cisco SIPs provide flexibility for the service diversity required in Next-Generation Networks, helping enable a single physical interface card to be used to support a variety of popular revenue-generating services, such as VPN tunneling, forwarding and filtering services all at line-rate performance.

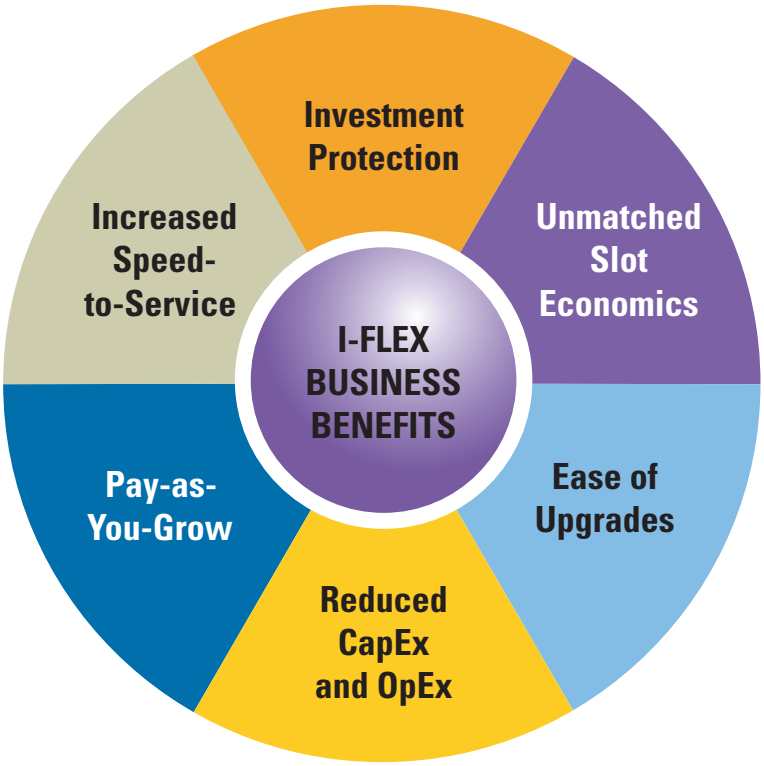
ON-BOARD SECURITY FOR GUARANTEED SERVICE DELIVERY

The Cisco I-Flex SIP design helps ensure secure infrastructure as well as the delivery of secure services; for example, filter lists can mitigate the effects of denial-of-service (DoS) attacks. As traffic spikes occur with more frequency, network equipment using I-Flex can provide defensive countermeasures against malicious acts. Alternatively, the Cisco I-Flex design enhances managed security services by offering capabilities such as VRF-aware IPSec and other managed service enhancements. The I-Flex design integrates service intelligence within the SIP, allowing providers to meet stringent SLAs and ensure that priority traffic is protected while capitalizing on advanced hierarchical queuing, and enhanced low-latency queuing that is specifically designed for "triple-play" services. And at the same time providers can offer proven QoS for tiered services, minimizing performance degradation and requiring no additional physical interface cards.

PER-REPLICANT PERFORMANCE CONTROL TO SCALE VIDEO SERVICES

The replication of multicast traffic to many receivers can tax router resources, resulting in degraded performance or unpredictability. Multicast is a common transmission technique for dispersing video from a single source to a massive audience. Multicast use has spread to numerous other one-to-many business environments, and it is now an important feature of all core and edge routers. The Cisco I-Flex design offers "per-replicant control," which replicates packets in the fabric rather than at network bottleneck points and allows providers to keep control over all packet replication. This implementation protects performance and helps enable predictable and efficient scaling, accelerating service delivery and enhancing VPN solutions.

I-FLEX: IMPROVING NETWORK ECONOMICS



SUMMARY

The Cisco I-Flex design combines SPAs and SIPs, taking advantage of an extensible design that helps enable service prioritization for data, voice, and video services. Enterprise and service provider customers can take advantage of improved slot economics resulting from modularity and programmable interface processors that are interchangeable across Cisco routing platforms.

The Cisco I-Flex design offers superior service intelligence and line-rate performance, maximizes connectivity options and provides a rich set of QoS features for premium service delivery while effectively reducing the overall cost of ownership for customers.

The Cisco I-Flex design is one more component of the Cisco IP NGN framework which is designed to facilitate the delivery of “triple play” and mobility services. Cisco maintains a companywide commitment to enhancing IP-based solutions and helping service providers cost-effectively leverage their infrastructure investments.

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