



**ICT
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Moving Toward the Programmable, Disaggregated Network

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Over the past decade or so, the prevailing trend in the network equipment industry has been consolidated, multi-function equipment. The move to WDM in the core, combined with a diverse set of technologies needed for transport, required a high degree of integration.

This approach, however, has disadvantages for network operators. First, these integrated platforms may force operators to purchase functionality they can't use. Second, technology combined into a multifunction platform may need to be "sub-optimized" to fit within the operational and physical constraints of that platform. Third, multifunction platforms are not an ideal fit for every network size. Since multipurpose networking platforms are also costly and energy-inefficient by today's standards, as well as occupying a lot of rack space, network operators have collectively turned to the vendor community for new approaches.

Multiple Forces Propel Change, Open Up New Possibilities

While multiple factors drive change in communications networks, massive bandwidth demand is almost a constant. The forces that propel this continually increasing demand are familiar throughout the industry: Over the Top (OTT) services; widespread adoption of smart mobile devices; the ascent of the Internet of Things, and general escalation in customer expectations as more and more

aspects of daily life require us to be online. The question is no longer whether or not increased bandwidth is needed, but how much will satisfy the demand.

A trend towards an open and programmable architecture has arisen that essentially applies design concepts from the IT world to benefit communications networks. As the lines begin to blur between the worlds of IT and Communications networks, new types of networks become possible along with a range of benefits and opportunities.

Fundamental Design Changes Needed in Network Equipment

Network equipment must change to enable programmable, open, scalable, simple networks. Programmable networks are built for software control. Software-based solutions are more flexible and faster to deploy (and later enhance) than any hardware-based solution, because there is no need to be physically present at the site.

Open networks also eliminate vendor lock-in, offering an environment that invites innovation, and enables multi-sourcing for maximum cost, competition, and supply advantages. Similarly, networks that are easy to scale reduce cost and testing times and allow for pay-as-you-grow capacity, resulting in a shift in capital spending from network equipment to revenue-generating ser-

vices. Finally, simple, open-architecture networks reduce operational complexities, speed service creation and activation, and produce a more agile business through software.

To achieve these programmable, open, scalable, simple networks, the needed change is "disaggregation." Disaggregation means separating networking equipment into functional components and allowing each component to be independently optimized and individually deployed, a less costly and much more flexible approach than traditional multifunction platforms. Ideally, disaggregated equipment is provided in the smallest form-factor capable of delivering a specific function (for the purposes of this article, this means a single rack unit (1RU) in height, which is 1.75 inches). This type of equipment should be self-contained, require no additional common equipment to operate, and incorporate open APIs to enable SDN control. Lastly, it is essential that new, disaggregated platforms be interoperable with legacy equipment, which allows operators to extend the functional life of these investments as long as necessary.

Disaggregated Hardware Benefits Networks of Any Size

It is against this backdrop that the disaggregated hardware platform has entered the arena. These networking platforms are the result of breaking up network equipment into "build it your way" functional components. The compact physical size, comparative simplicity and component-based design of these platforms result in massive physical downsizing, flexibility, open architecture, and ideally, programmability.

Disaggregation was first implemented in IT networks and is now being picked up by communications network operators because of its compelling benefits. These benefits can be realized not only on large communications networks, but across the whole spectrum of network types and sizes:

1. Efficient, and pay-as-you-grow scaling – Network transformation

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can start with as little as a single piece of equipment, providing low initial cost and as-needed growth in increments of 1RU. You buy only the functions needed and pay for additional capacity only when demand grows enough to justify it. This is in stark contrast to large multipurpose implementations that carry heavy up-front costs, impose additional cost for unused functions, and require additional common equipment to operate.

2. Rack Space Utilization – A small, dense form-factor allows for full utilization of rack space in increments of 1RU. This eliminates rack unit waste for shelves that are not fully utilized and which consequently prevent the installation of other equipment into that rack space.
3. Innovation – When designing multifunction equipment, you are constrained by the form-factor, the system software, and the dependencies among the other functions incorporated into the multifunction shelf environment. Disaggregation breaks apart the shelf and makes each functional component independent. Thus, the physical form factor is neither dictated nor limited by a shelf. Independent functions and software provide freedom of innovation not possible in multifunctional equipment—and result in less testing because there are fewer dependencies to test.
4. Open Architecture – With the arrival of open architecture and

open APIs, you can now choose to build your network with the best-of-breed equipment in each functional area. The network can be virtually converged using software, providing operational consistency across diverse functions and vendors. An open architecture also favors continual operational and software advancement and improvement, reduces costs and cuts time to market for new service deployments.

Disaggregated Hardware: Why Now?

You may be wondering: if disaggregation is so great, why did multifunctional equipment become predominant in the first place? The answer effectively comes down to the timing of technological advancements. The hardware and software technology is only now reaching the maturity to make disaggregation possible. Next-generation hardware technology like CD/CDC ROADM enables programmability of the communication network hardware and inception of SDN/NFV and other software advancements; the hardware technology basis needed to pull the disaggregated network together is just now being realized.

Disaggregation's Sweet Spot Combines Immediate Benefit and a Path Forward

The future of networking equipment is disaggregation. Programmable, open, scalable, and simple networks are needed to meet growing demand and competition. Operators who create custom disaggregated networks can turn their network from an expense into a competitive advantage. But this cannot happen overnight. Existing network assets need

to be utilized and the whole network transformed over time. It is therefore vital that the disaggregated equipment you choose can interoperate with your existing network, adding new functionality and lifespan to your existing assets, delivering immediate and incremental benefits, and preparing the way forward in affordable steps.

As disaggregation matures, an ecosystem of vendors will evolve, new software applications will be developed, and innovation in functional hardware will improve cost, density, and power. But to realize the immediate benefits available, the time to get started with disaggregation is today.



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positions in network operations, software, optical transmission, and wireless.

Steve began his career at Bell Labs and Bellcore, working in transmission from 1982 to 1987. He then spent five years at Bell Northern Research, working in switching.

Steve received his B.Sc. in biology and psychology from SUNY Buffalo, and his M.Sc. in industrial and operations engineering from the University of Michigan at Ann Arbor.

Move Your Network Forward



The Pay-as-You-Grow Path to a Programmable Network

The Fujitsu 1FINITY™ disaggregated, programmable platform interoperates with your existing revenue-bearing network equipment assets and provides the hardware foundation for software-controlled architecture for any size network. By choosing 1FINITY products, you can progressively transform your network by adding new technologies and service offerings, plus easily add SDN/NFV at the right time for your business.

Talk to your Walker representative and let's begin planning the way ahead.

1FINITY DISAGGREGATED, PROGRAMMABLE PLATFORM



Transport



Switch



Lambda



Access

- "Blade-centric" physical design for efficient rack space utilization
- Next-generation access, transport, wavelength and switching
- Open optics, APIs and protocols
- Interoperable with existing equipment, including FLASHWAVE® platforms
- Fully programmable and SDN-ready

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