

Network Processors: Prospects for Future Deployment

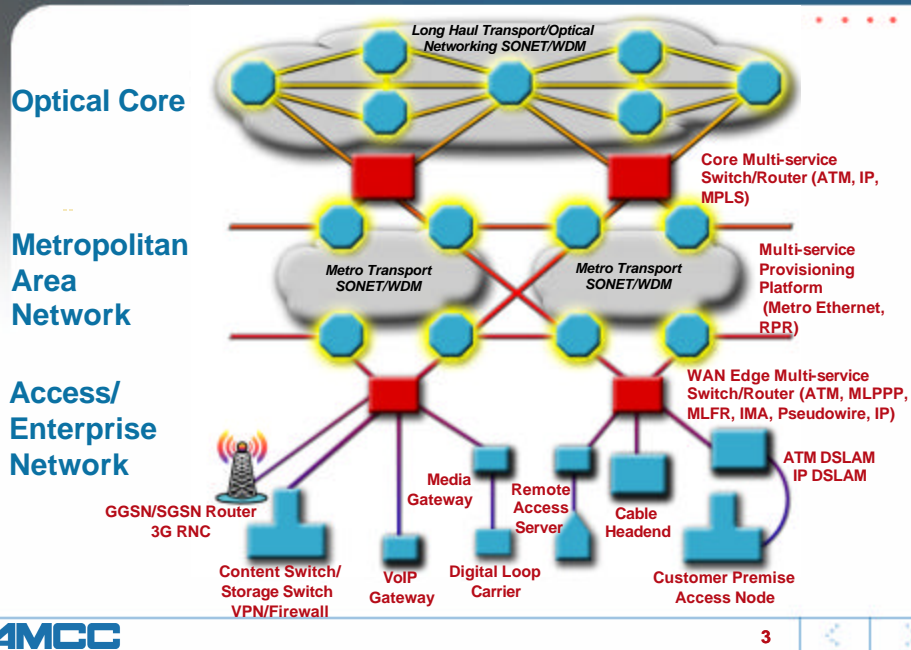
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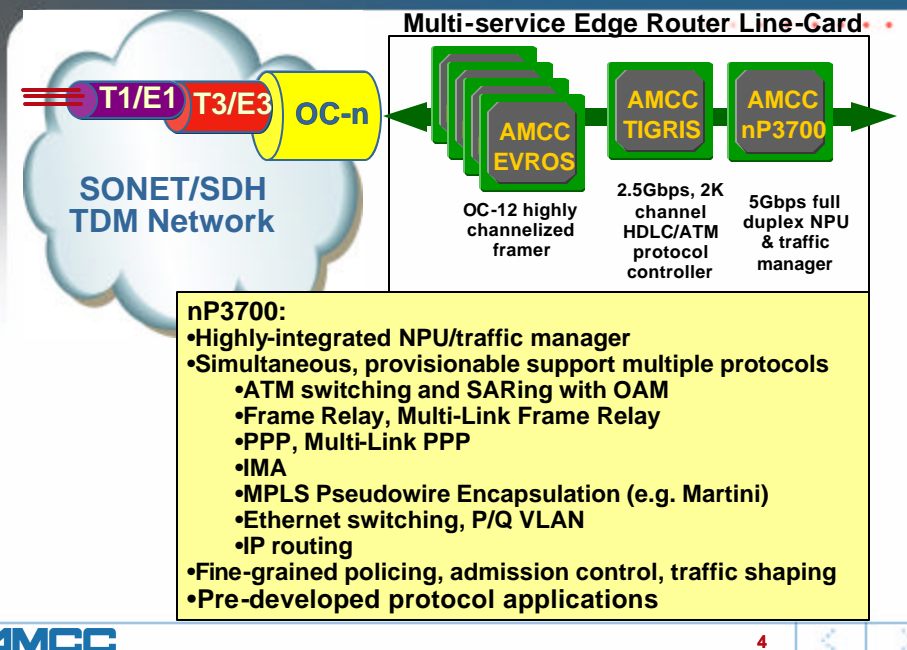
NPUs Have Been Widely Adopted

- **Major shift to use of off-the-shelf NPUs over past 24 months**
 - **Startups, minor Tier1 platforms drove initial adoption wave**
 - **Now, major equipment platforms at all Tier1 companies**
- **Why?**
 - **Huge improvements in NPU function and performance**
 - Much more processing power, much higher memory bandwidth
 - Full line-rate throughput with real production feature sets
 - Integration of sophisticated traffic management
 - Solid development tools and quality application software
 - NPU vendors have applied system knowledge gained over multiple product generations
 - **Equipment makers cannot afford ASIC development**
 - Low estimate of \$10M for a complex design in 0.13um
 - **Consolidation in NPU supplier base leaves clearer choices, stable supply for equipment makers**
 - **Network convergence driving demand for 'Any Service Any Port'**

Where Are NPUs Being Used? (It's Not Just Routers)



Any Service Any Port Application Example



What Does The Future Hold for NPUs?

- Focused investment in data services driving increased demand
- Continued evolution of NPU product capability
 - Higher port bandwidth, more processing headroom, more complex flows, rich traffic management
- Vertically-targeted network element solutions
 - Integrated chip and chipset solutions including framers, PHYs, switches
 - Pre-developed and tested protocol software
- Sub-system level integration by NPU vendors and third-parties
 - ATCA platform initiative driving this
- Opportunity for standardization of programming interfaces
 - Standards organizations (e.g. NPF) making some progress however lacking drive from equipment makers
 - Alliances between 3rd-party software providers and NPU vendors