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)

Long Haul Transport/Optical Networking SONET/WDM
Metro Transport SONET/WDM
Core Multi-service Switch/Router (ATM, IP, MPLS)
Multi-service Provisioning Platform (Metro Ethernet, RPR)
WAN Edge Multi-service Switch/Router (ATM, MLPPP, MLFR, IMA, Pseudowire, IP)
Optical Core

Optical Core

Metro Transport SONET/WDM
Core Multi-service Switch/Router (ATM, IP, MPLS)

Access/Enterprise Network

GGSN/SGSN Router 3G RNC
3G RNC
Content Switch/Storage SwitchVPN/Firewall
VOP Gateway
Digital Loop Carrier
Remote Access Server
Cable Headend
Customer Premise Access Node

Any Service Any Port Application Example

SONET/SDH TDM Network

T1/E1 T3/E3 OC-n

Multi-service Edge Router Line-Card

AMCC
AMCC TIGRIS
AMCC npP3700

npP3700:
- Highly-integrated NPU/traffic manager
- Simultaneous, provisionable support multiple protocols
  - ATM switching and SARing with OAM
  - Frame Relay, Multi-Link Frame Relay
  - PPP, Multi-Link PPP
  - IMA
  - MPLS Pseudowire Encapsulation (e.g. Martini)
  - Ethernet switching, P/Q VLAN
  - IP routing
- Fine-grained policing, admission control, traffic shaping
- Pre-developed protocol applications
### 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