The Future of Networking

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October 30, 2014 (40° 45’ 17.1” N 73° 58’ 38.9” W)
Introduction

• The networking industry is unstable
• Because people are confused

• My purpose today
  • Undo the confusion
  • Convince you about Juniper’s vision and execution
Contents

I. Market
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Our Market

- Packet based IP routing, switching and security
- $40Bn, growing at a CAGR of ~3%
- Four categories
  - LAN
  - WAN “Core”
  - WAN “Edge”
  - Security

- Less than 15% is subject to commoditization
  - (Low end Ethernet switches)

Sources: Traditional TAM View: Infonetics, Dell’Oro
Our Market

- Essentially all network traffic is IP over Ethernet
  - Market is coming towards us
- Essentially all traffic begins and ends at a computer
  - High growth

- Therefore all networks need routers
- And all networks need security

*Understanding and solving these network problems is Juniper’s core competency*
Our Customers

• Telco, Cable, Web2.0, Financial, Government, Strategic Enterprise
• Largest and most demanding subset

• Most common asks are
  • Help us reduce OPEX
  • Help us become AGILE and EFFICIENT
  • Help us reduce CAPEX

• Telco and Cable have one more ask
  • Help us MONETIZE our networks
Our Strategy

- High-IQ
- Cloud Builder

Is based on Fundamentals
Fundamentals: Economics

“Apply the latest advances in technology to our products”
“Automate everything that can be automated”
Fundamentals: Networking

• Two greatest advances in last 40 years
  • *Packet switching* increased *efficiency*
  • *Routing* (dynamic topology discovery) *automated* network operations

• The next advances will be in
  • *SDN* – Logically centralized functions
  • *NFV* – Stateful (L4-L7) functions

These advances will be in *addition to*, not *instead of* packet switching and routing!
Fundamentals: Networking

• Scale, capacity, and reliability are extremely valuable

• Routers are the only known way to deliver these capabilities

• Simpler network problems do exist

• Routers can be simplified to solve these problems
  • We are doing this today (PTX, QFX)
Fundamentals: Routing 101

• Routers have five crucial properties
  • *Dynamism*
  • *Stat-mux gain*
  • *Distance*
  • *Network scale*
  • *Sophistication*

• When one or more of these crucial properties can be relaxed, a router can be simplified to deliver lower cost
Fundamentals: Packet Forwarding Engines

- **Number of Instructions per bit transported**
  - Stateless (history independent) forwarding
  - Stateful (history dependent) forwarding

- **Number of external memory references per bit**
  - 0
  - $10^{-3} - 10^{-2}$
  - $10^{-2} - 10^{-1}$
  - $10^{-1} - 1$
  - $1$ - $10$
  - $> 10$

**Devices**
- Fabric Silicon
- TOR Switching Silicon
- Core Routing Silicon
- Edge Routing Silicon
- General-Purpose Microprocessor

Source: Juniper Networks, Inc.
Fundamentals: Packet Forwarding Engines

“Performance and functionality are inversely related”

Performance (Gbits/sec) vs. Energy per bit (pico-Joules/bit)

Stateless (history independent) computations vs. Stateful (history dependent) computations

Fabric, LAN Core, WAN Core, WAN Edge, L4-L7, X86

Source: Juniper Networks, Inc.
Fundamentals: What the numbers tell us

JNPR Single Line Card Performance

x86 Dual Socket Server Performance

Source: Juniper Networks, Inc.
Execution

High IQ

Revolutionize the agility, efficiency and monetizability of networks through automation

Cloud Builder

Build the most scalable, reliable, secure, and cost-effective networks in the world
Three dimensions

SDN Controller (scale-out x86/ARM)

NFV (scale out x86+assist)

Specialized silicon
Agile software
Integrated systems

L2/L3/L4 Packet Switching: (scale, performance, reliability, price-performance)

Contrail

Automation: (agility, efficiency, insights)

Security

L4-L7: (virtualization)
Summary

• Routers are essential to networking (no routers, no Internet!)
• Routers can be simplified to address less complex applications
• SDN and NFV are not a substitute for routing
• x86 is a poor choice for mid to high-end routers
• The networking industry is hungry for solutions along X, Y, Z
• There is tremendous room for innovation

Juniper’s best days are ahead!
A Personal Note

• Juniper has never lacked vision:
  • Revolutionized routing
  • Improved performance by 500x over 16 years (47% CAGR)
  • Integrated L4-L7 services into routers
  • Right vision for scalable DC fabrics
  • Foresaw collapse of routed and optical layers; delivered PTX

• Executing on a vision is not easy: no one has a 100% success rate
• But it is the only way forward for us
• I believe we have a much more focused strategy
• I know we have a fantastic set of products coming
• I’d like your continued support
Questions