Broadcom Ships Jericho2: Driving the Merchant Silicon Revolution in Carrier Networks

Under Embargo
Confidential Until 6am PDT, March 6 2018
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The Most Powerful, Scalable Switch-Router Silicon on the Planet

- Chipset Solution Scaling > 200 Tb/s in a Single Chassis
- Elastic Pipe™ Ground Breaking Packet Processor
- Distributed and Robust Packet Buffer with Optional HBM Expansion
- Redefining Router Economics, Power and Form Factor

NOW SHIPPING
Durable Juniper
Ramon
192x 50G SerDes

NOW SHIPPING
Jericho2
10 Tb/s Device
208 x 50G SerDes
Merchant Silicon Outpacing Moore’s Law

Carrier Network Infrastructure Transformation

Over 5X the Performance from Jericho+
20X the Performance in 5 Years

2012
Arad+
480 Gb/s

2015
Jericho
1200 Gb/s

2016
Jericho+
1800 Gb/s

2018
Jericho2
10000 Gb/s

2016
Jericho+ 36X100GE Line Cards 3.6T

2018
Jericho2 36X400GE Line Cards 9.6T

2016
2018
1.8T 10T

2012-2018

9.6T

10T

480
1200
1800
10000

2012
2015
2016
2018
Introducing StrataDNX™ 2018

Switch-Router

- Up to 10Tb/s switching capacity per device
- Elastic Pipe™
  - Flexible binding of a centralized database to any stage of the pipe
  - Extending Jericho2 pipe via a pool of additional general purpose stages
- 10GE, 25GE, 40GE, 50GE, 100GE, 200GE, 400GE interfaces
- Carrier grade Hierarchical Traffic Manager
- In package, scalable packet buffer memory using HBM
- Over 2M IPv4 on chip (1M IPv6), Over 12M using external memory device

Interconnect Fabric

- Switch fabric supporting up to 9.6Tb/s per device
- Supports over 200Tb/s in a single modular system
- One generation of backward and forward Compatibility
- The most power efficient switch in the Industry
- 50Gb/s PAM-4 SerDes

Now sampling to customers
Jericho 2: Purpose-Built for Next-Gen Routing Requirements

Traffic Management with 8GB of High Bandwidth Memory
- Eliminates packet drops
- In-package, low power and high performance deep packet buffering
- Seamless expansion from on-chip buffer to HBM
  - Packet queueing utilizing on-chip buffer
  - Congested flows handled via HBM

Elastic Pipe™
- Extending Jericho2 pipe via a pool of additional general purpose stages
- Future proof and programmable pipe with elastic extension
- Flexible binding of a centralized database to any stage of the pipe
Jericho2: Quantum Leap in Router Power & Cost Efficiency

Redefining Router Economics, Power and Form Factor
Democratizing the Most Complex Area of Networking

OEM ASIC

Jericho2

Merchant Silicon

18X Capacity

Router Disaggregation

Enabling Whitebox and Disaggregated Economics
Jericho2: Unparalleled Router Economics at 100GE/400GE

36x400GE
Jericho2/Ramon Based

<$1K per 400GE Router Port*

* Excluding optics

Jericho2 ODM Router Systems Available Q4 2018 at Market-Disrupting Prices
The Router Merchant Silicon Revolution Has Already Started

- IPv6 SR
- 400GE SAT
- VxLAN-EVPN
- BIER Multicast
- SAT
- PBR
- PIC
- PPPoE
- MPLS-SR
- MPLS-EVPN
- MCAST SM/SSM
- Carrier-Grade Statistics
- Low-Latency Protection
- Routing in/out of tunnels
- Expandable ACLs and DBs
- Hardware Accelerated OAM
- IPv4/IPv6 complete internet FIB
Elastic Pipe™, Modular Databases

- Different networking segments require different database scales
- Jericho2 adjusts database sizing based on profiles
- Elastic pipe™ enables flexible binding of a centralized database to any pipe stage
- Scale expandable through an external lookup device (KBP)
Elastic Pipe™, Future Proof Switch-Router

- DNX packet processor is composed of programmable pipe stages
- Jericho2 enables pipe extension via a pool of programmable elements
- Elastic pipe™ - creating a new pipe by adding stages
BCM88690 DNX “Jericho2”

- 10Tb/s line card performance
  - 208 50G PAM-4 SerDes
- Deep buffering using HBM
- Elastic Pipe™ with external table expansion (KBP)
- Hierarchical Traffic Management
- Network Instrumentation and Telemetry
  - Hardware accelerator

Available Now For Qualified Customers
Jericho2 Programmability

- Jericho2’s Elastic Pipe™ takes programmability a step further
  - Evolution of the StrataDNX field proven programmable pipe
- Addressing ever-changing switch-router requirements
  - allowing OEMs and service providers to protect their investment
- The Elastic Pipe™ allows a fast turn-around for Protocol upgrades
  - C++ programming and integration into the fully tested Broadcom SDK
- Factory programmable datapath via high-level C++ language
  - C++ development environment for qualified customers
Industry-Best Silicon for Chassis

- Incast prevention
  - Credit based virtual output queues

- Easy migration to the next bandwidth standard e.g. 100GE to 400GE
  - Eliminating speed mismatch using cell based fabric

- HBM and OCB only (On Chip Buffer) device flavors
Summary – Jericho2 Excels the Router Checklist

- Large scale, carrier grade, expandable IP-MPLS forwarding
- High bandwidth, High density
- Hundreds of milliseconds of deep buffering
- Tens of thousands of subscriber sessions; Scheduling and Policing per session
- Elastic Pipe, delivering Advanced Packet processing, Programmability, and investment protection
- Carrier Grade Functionality, Diagnostics, OAM, SAT and Instrumentation
- High integration, changing the router economics for power and cost
Thank You!
Distributed Buffer Scaling

- Flexible packet buffer behavior. On Chip Buffer and HBM
- Low latency, OCB-based under normal conditions
- Seamless migration to HBM memory for congested flows
Seamless Packet Buffer Optimization to any Network Scenario

- DBS enables the use of JR2 across various network scenarios
- DBS optimizes flow completion time
  - Memory assignment per VOQ (OCB/HBM)
  - Seamless expansion to HBM and back based on congestion levels – **No packet drops!**
- No packet buffer tuning
- Robust and future proof
  - Ready for future protocols buffering requirements
Ethernet Fabric Drops on Incast

- Ingress traffic pushed to egress
- Egress buffer derives max burst size
- Egress buffer might overflow (drops)
- Effective buffer size is equal to the egress buffer size of the egress chip
- Entire Incast traffic reaches a single OCB
DNX Fabric, Incast Prevention

- Ingress traffic stored in VOQ
  - No congestion
- Egress port pulls the stored traffic
- Egress buffer never fills up
- Effective buffer size is equal to the sum of ingress devices VOQs
- Incast traffic distributed between all ingress devices
Pipe Architecture Comparison

Not Centralized, Fungible

Partly Fungible, Partly Centralized

Centralized & Fungible

Jericho2
Jericho2 Solutions

Data Center

Spine / Leaf

Top of Rack

DCI

DC Core

Service Provider

SP Cloud

Core/Agg Router

Edge/Agg Router