

## White Boxes for the BNG Use Case

Carsten Michel, Senior Expert NGN, Deutsche Telekom Winnie Lin, Senior R&D Director, Delta Electronics













## **DT Access 4.0 Mission Statement**

# ACCESS 4.0

## "We develop a cost-efficient, lean-to-operate and scalable access platform to deliver Gigabit products"











## What is Access 4.0/A4?

#### **SCOPE OF ACCESS 4.0**

- Extensive **D2C (Design-To-Cost)** project for **FTTH/B**
- Everything monitored in a **comprehensive Cost Model**
- Design and engineering using **bare metal / OCP hardware**, lots of open-source software as well as merchant silicon
- Application of **data center principles**, leaf/spine fabric, CI/CD, ...
- **Clean IT architecture** (Las Vegas principle)

#### **OBJECTIVES OF ACCESS 4.0**

- **Save** CapEx and OpEx
- **Reduce vendor lock**; bring in new players
- Drive automation
- **Time-to-Market for services** (keep business logic SW in house)
- Increase **flexibility** for capacity mgmt, change-over, migration, ...











# **BNG in a Nutshell**

- Broadband Network Gateway (BNG) is an edge device of the IP network
- BNG aggregates user sessions, e.g. **PPP** sessions, from the access network
- Responsible for **authentication**, **authorization** and accounting enforcement
- Manages subscribers IP addresses
- Forwards packet to the IP core network











# **BNG on Whitebox Switches**

### **Motivation**

- Lot of work has been done for data center environment which addresses key points like openness, automation, programmability
- Not very well suited for subscriber edge functionality

### **Technical Requirement**

- **Termination of Q-in-Q** tagged Ethernet frames (S-VLAN, C-VLAN)
- **Termination of PPPoE** session (including LCP, IPCP, IPv6CP)
- Authentication, Authorization and Accounting (RADIUS) (control plane only)
- Subscriber IP address management (control plane only)
- Customer specific IP packet filter, for instance anti-spoofing filters
- Hierarchical (aka per subscriber) Quality of Service for various services (e.g. VoIP, IPTV, etc.)
- **Multicast Replication**
- **Termination of L2TP tunnel for wholesale**
- Subscriber-aware counting and statistics for both operation as well as billing











## ACCESS 4.0 Core Beliefs and Drivers

#### Homogeneity

Same Platforms for a few Use-Cases for Single or **Multiple Operators** 

### Manageability

Help Reducing **Operational Team's** Efforts in Installation and Maintenance

Same ASIC with SPINE and LEAF Configurations

#### **Standardization**

with 2RU Chassis, Same PSU and Fan-Tray, 80mm Fan-tray for **Ionger MTBF; BMC Supported** 







### Flexibility

Modular Design for Various **Application and** Operator

#### Efficiency

Space, Power, MTBF, Lifecycle and etc.

#### **Modular CPU Board**

with Compatibility of CPU options and System Memory/Storage

#### **Compact Design** with High Power Efficiency

and Longer Life-Cycle



## New Hardware Design - Considerations

AGCX422S 22\*QSFP28 and 4\*QSFP-DD



AGCVA48S 4\*SFP+, 48\*SFP28 and 10\*QSFP28













#### Qumran 2C (2.4Tbps)

HQoS TM, Scalability, Deep Buffer, Programmability



### Xeon D1500/D1600

**High Performance with QAT** 



#### **On-Chip Buffer 4GB HBM for Elastic Pipeline**



#### Ex. TCAM

KBP for Larger Table (IPv4/IPv6), ACLs and Statistics



#### **Statistics**

**TAP as Optional Module** 



#### SyncE/1588v2\*

ToD, BITS, 1PPS, 10MHz and etc. \*Time Synchronization supported on all ingress and egress ports





## What's inside? HLD - Leaf Platform







- •DNX Qumran 2C (**2.4Tbps**, ILKN and OTN Supported)
- Choose between KBP (TCAM) or **TAP (Statistics)**
- •SFP+ and SFP28 for smaller access interfaces
- •Time Synchronization (1588v2)
- •**BMC**/OpenBMC Support









and a state and a state



# What's inside? HLD - Spine Platform







•DNX Qumran 2C (**2.4Tbps**, ILKN and OTN Supported)

Non-KBP/TAP Design

•QSFP28 and QSFP-DD for larger backbone interfaces

•Time Synchronization (**1588v2**)

•**BMC**/OpenBMC Support

PCle

x4

14 x QSFP28 100G

**25G** 

**Serdes** 





### What's inside? Inside of SPINE Platform NETWORKING **DRAM-Module Timing Injection** Interface **SSD Storage 400G Connectivity Mounting Post of Sliding Rail**





### Open. Together.



22\*QSFP28

## What's inside? HLD - CPU Module

UMMIT





- Modular CPU Board Design
- Upgradable CPU Module
- **Dual FLASH** for BIOS Backup
- Upgradable RAM Module
- **Dual Storage** (SATA3 and PCIe) for Switch OS Backup
- **TPM** supported



## Improving Operation Efficiency





<ul> <li>Design is intended to be compatible</li> </ul>	
with any optical transceivers	

#### •Standard chassis for Central Office requirements

•ETSI\* and NEBS\* compliant (\*in-progress)













 80mm fan-tray to extend switch life cycle

 Modular design of fan-tray for easy maintenance

•High efficiency PSU, achieving **98%+ efficiency** 

•AC/DC and OCP PTM (Pass-**Through Module) Compatible** 









## How Do We Proceed

- We are seeking for active feedback from the community
  - Feedback on the proposed design
  - Interest in having / using such a box?
  - Interest in collaborating?
- In case of common interest, DT and Delta plan to contribute specification of BNG-capable switch design to OCP





## **Open.** Together.







### To be OCP Accepted (in-progress)













# Open. Together.

**OCP Regional Summit** 26-27, September, 2019

