Network Function Virtualization for Customer Premise Locations

**Traditional Network Appliance Approach**
- Specialized, proprietary hardware
- Physical install per appliance per site
- Complex network management

**Network Function Virtualization Approach**
*Functions run on x86 as VMs or Containers*
- vRouter
- vWAN-X
- vFirewall

**Standard x86 hardware platform**
- Multiple functions on a single device
- Less complexity, improved TCO
Background and Goals

Background:
• AT&T been developing whitebox solutions in the customer premise space for 15+ year
• The AT&T VPN Gateway provides IPsec based VPNs to small/medium enterprise locations
• AT&T has the hardware built for us and AT&T owns and develops the software that runs the box
• Over 100K units currently in production
• In 2014, as part of our goal to virtualize and SDN control 75% of our network by 2020, AT&T started work on a larger x86 uCPE platform to support multiple Virtual Network Functions (VNFs) on a single box
• AT&T is currently shipping our GA uCPE marketed under AT&T Flexware

Goals with OCP:
• To take advantage of the OCP community to define a reference architecture spec for uCPE
• Bring the innovation and requirements from across our industry to provide a high quality, cost effective solution for our end customers
• Make the hardware standard and allow the traditional network vendor community to focus their resources on software solutions (base OS and VNF based products)
Architectural Guidelines

Create an architecture to meet the demands at the customer premise:

- x86 based CPU with crypto co-processor option
- Trusted Platform Module (TPM)
- Flexible RAM and storage options
- Ethernet network interfaces with Power over Ethernet (POE) option
- Merchant silicon chip for local LAN switching
- Baseboard Management Controller (BMC) for Out of Band Management
- Single and dual power options with last gasp support
- Modular interface slot to support optional items (LTE modem, extra storage, TDM interface, etc.)
- Firmware Items – ONIE bootloader, Switch Abstraction Interface, BIOS

Items to Consider:

- May need multiple specs based in small, medium, large sizes
- Each size could be based on a different CPU chipset, physical size, port count, etc.
- Within each size range items will have to be variable (core count, memory, storage, etc.)
Open uCPE Hardware – High Level Architecture
Call to Action

**AT&T is looking to form a team of interested parties to help define the detailed spec:**

- Define key hardware components (CPU, memory, BMC, etc.)
- Define what components are fixed and which are variable
- BIOS, ONIE types/versions to be used
- Work on different uCPE sizes
- Physical design for the box