



CMTS : uBR Hardware & Software Roadmap Update

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Many of the products and features described herein remain in varying stages of development and will be offered on a when-and-if-available basis. This information is subject to change at the sole discretion of Cisco, and Cisco will have no liability for delay in the delivery or failure to deliver any of the products or features set forth in this document.



Indus (IOS 12.2SCI) Release

SCI Features: Released: Sept 2014

- 6G SPA Hardware and software
Enables 72 Gbps of DOCSIS connectivity (1,728 channels) in single uBR10k
- Dynamic DOCSIS 3.0 Load Balancing for Downstream
- BFD Support for uplink protection
 - Support for upto 4 peers with keep-alives 500ms and above.

Hardware* Support List in Indus

- Supported hardware

 - uBR10K

 - PRE4

 - PRE5

 - 6G SPA (firmware upgrade to 3G SPA HW)**

 - 20x20V

 - 3G60

 - 1G D30 SPA

 - SIP-600 SPA carrier card

 - DTCC

 - 2400W PS's (AC and DC)

 - 3300W PS's (AC and DC)

 - RFSW

 - RFSW-ADV (NGRFSW)

 - uBR7200

 - uBR7246 VXR

 - MC88V

 - NPE-G2

 - uBR7225 (Pizza Box)

 - MC88V

 - NPE-G2

- Unsupported hardware

 - uBR10K

 - PRE1

 - PRE2

 - 520H

 - 520S

 - 520U

 - 2XDS-SIP 2-SPA carrier card

 - OC12 POS/SRP

 - OC48

 - Full Height GigE

 - Half Height GigE

 - TCC+

 - uBR7100 Series

 - uBR7200

 - NPE-400 (or lower)

 - MC28C/16C/16S/16U/16X/28X

 - E-16U

 - NPE-G1

 - MC28U

*Not necessarily an exhaustive list, refer to Cisco technical documentation for complete information

SCI-1 Features: Released: Feb 2015

1. 32x8 CM support and 32-channel DS bonding***
2. 6G-SPA operational enhancements
3. 6G SPA Ironbus utilization MIB
4. Energy Mgmt: Disable channel bonding for MTAs running on battery***
5. Configurable DSCP for DS traffic
6. RFC 6939 : CM MAC Addr DHCPv6 Option support
7. IPv6 remote query
8. IPv6 device class reporting

*** Interop support only. Depends on availability of production quality modems

SCI-2 Features: Released: July 2015

1. 32 Channel DS bonding further testing support
2. PRE parity error double failure protection
3. Battery mode 1x1 operation
4. CLI knob to switch to local timezone for IPDR record
5. IPDR ACL support
6. SNMP Cache for performance improvement



Jordan (IOS 12.2SCJ) Release

SCJ Features: Roadmap : CCO Target Dec 2015

1. Energy management ECN (MULPIv3.0-N-12.1071-10)***
 - Implement ECN to provide traffic utilization based switchover to 1x1 mode
2. BSoD VLAN Link Redundancy
 - Ability to configure a backup Ethernet interface for BSoD
3. LACP
 - Be able to bundle backhaul interfaces together using LACP. Note this is only for IP routing. That is, BSoD with LACP is not support.
4. Voice over IPv6
 - Voice calls using IPv6 addresses
5. IPv6 DDoS protection enhancements:
 - Protect control plane from IPv6 DDoS attacks.
6. PCMM Multicast with mVPN
 - Make sure PCMM multicast and mVPN config can co-exist.
7. SF/Classifiers summary counters per SG
 - Command to display count of classifiers and service-flows per Service Group

SCJ1 Features: Roadmap : CCO Target April 2016

1. VDOC support for 24x8 gateways
 - VDOC support for modems/gateways with 24 channels
2. Update PCMM to allow for IPv4 and IPv6 classifiers for the same Gate (ECN: MM-N-13.0697-1)
 - Implement ECN that specifies how a single gate can include both IPv4 and IPv6 classifiers.
3. 5k DSG Session scale and hardening
 - Enable support for 5k DSG sessions sustained operations.
4. Service Group Admission Control
 - Port over SGAC functionality from cBR-8. Provide admission control at a SG level.

“Gigabit” The holy grale

Does it have to be done with 3.1?

Requirements

It is possible to introduce a 1 Gbps DS product based on existing DOCSIS 3.0 infrastructure much quicker and with much less cost compared to a full upgrade to DOCSIS 3.1.

- Make sure you are using EuroDOCSIS
- Additional Spectrum and Channel Plan
- Additional licenses for CMTS's and EQAM's
- Make sure the latest SW is installed on the CMTS (uBR10012)
- A modem supporting 32 DS

Eurodocsis

- Annex A 8 MHz QAM's, as used by EuroDOCSIS, provide approximately 50 Mbps per QAM using QAM256 modulation.
 - 24 QAM's = 1200 Mbit
 - 32 QAM's = 1600 Mbit
- Depending of the level of over subscription wanted by the SP both scenarios could come into play and could deliver Gigabit services. Particularly in the upstart of having Gigabit services at all in cable networks where the number of Gigabit subscribers will be very low.
- It is a general recommendation from Cisco to use 32 QAM's when delivering Gigabit services to allow enough leg room to deliver Gigabit speed + service to other subscribers if, and when a Gigabit subscriber actually uses the Gigabit speed.

Frequency plan

Assuming frequency plan is moving from 16 DS pr. SG

- Allocate an additional eight 8 MHz QAM's per SG, which sums up to 64 MHz.
- If you are migrating from DOSIS to EuroDOCSIS and you have not allocated 8 Mhz rasters for DOCSIS. You need to allocate additional spectrum going from 24 6 MHz channels to 24 8 MHz channels. This additional spectrum sums up to 48 MHz.
- Reducing/removing PAL TV Channels may provide the frequencies needed to do the above.

Licenses

- For each SG an additional 16 DOCSIS 3.0 DS licenses are needed on the uBR10k CMTS, compared to a scenario with 16 DS per SG.
- A uBR10k supporting 40 SG, thus 640 DS licenses are needed.
- If the EQAM used with the M-CMTS is Cisco RFGW-10, an additional 16 unique QAM licenses are needed per SG/Connector.
- A RFGW-10 supporting 80 SG, thus 1280 QAM licenses are needed.

Software (and hardware) requirements

- Cisco uBR10k requires the latest IOS SW, 12.2(33)SCI, to support the “6G-SPA”.
This IOS image contains a FW upgrade of the SPA-UBR10-DS-HD module, which increases the number of EuroDOCSIS DS supported from 60 to 120 per SPA card.

DS calculation

A Cisco uBR10K will support 40 Service Groups with 32 EuroDOCSIS Down Streams the following way:

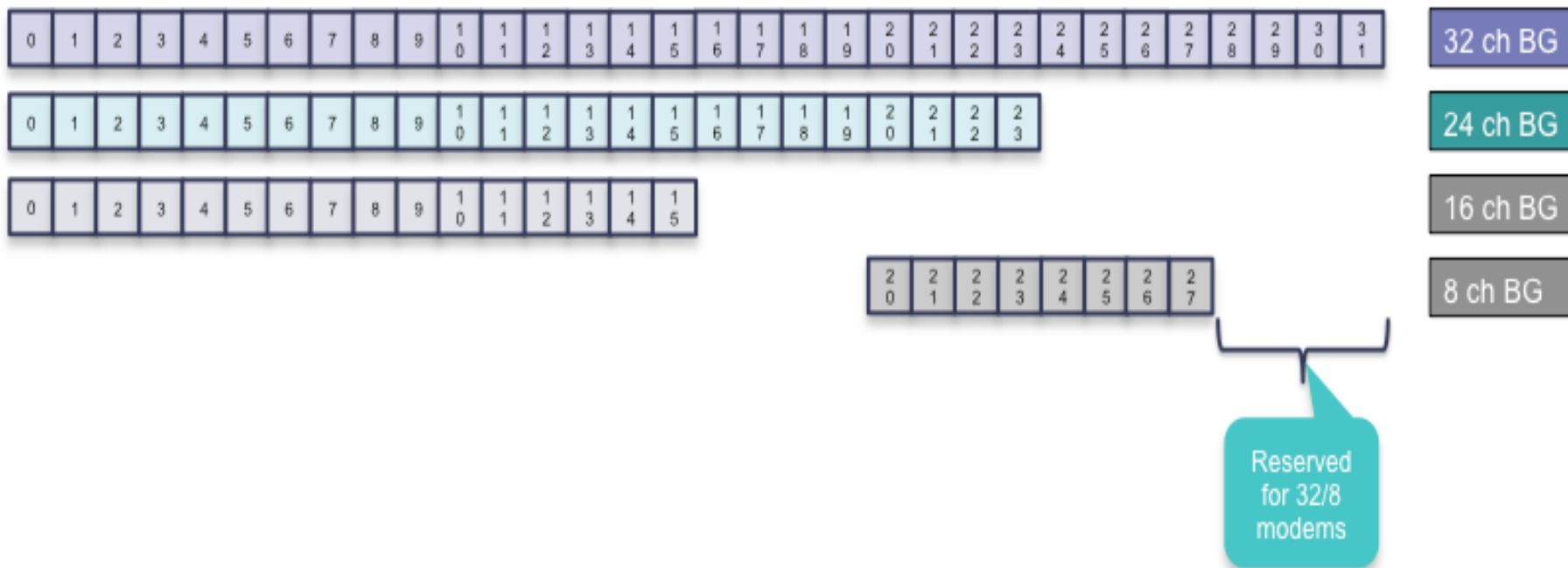
- 8 uBR-MC3G60V (3G60) linecards with SPA-UBR10-DS-HD (6G-SPA)
- The 3G60 Linecards will handle two Service Groups all in all 64 DS which will slightly over subscribe the 3 X 1 Gigabit ports, as 64 represents a max capacity of 3.2 Gbps.
 - The likelihood of both SG's and all 64 DS being fully utilized at the same time is however very small, especially if the last 2 DS in each SG are reserved for the 32 DS bonding group and thus only used by the 1 Gbps customers.
- The 6G-SPA will handle three Service Groups all in all 96 DS at a max capacity of 4.8 Gbps

DS Calculation (continued)

- The potential maximum traffic offered from each uBR10k will be $40 * 1.6 \text{ Gbps} = 64 \text{ Gbps}$, which is an oversubscription of the $5 * 10 \text{ Gbps}$ available between the switch and the RFGW-10.
- It is however very unlikely that all 40 SG's in the uBR10k peaks above 1 Gbps at the same time and thus this oversubscription should be easily justified.
- Oversubscription has been part of the SP business for years and are a accepted production risk. The levels of over subscription seen here is in the low end of over subscription

Bonding Group layout

A suggested BG layout supporting 8/4 modems, 16/4 modems, 24/8 modems and 32/8 modems could look like this:



Modem with 32 DS

- Modems based on e.g. the BCM3390 chipset as well as chipsets from other vendors will support 32 single-carrier DOCSIS 3.0 QAM downstream channels and eight single-carrier DOCSIS 3.0 QAM upstream channels as well as DOCSIS 3.1 DS and US.
- These modems are scheduled to be available as test samples in fall of 2015, going to production later in 2015 and large volume production during 2016.

Summary

- DOCSIS 3.0 does enable 1 Gigabit services (1.6 Gigabit / SG)
- DOCSIS 3.0 offers a affordable entry to the Gigabit market in which the number of 1 Gigabit customers will be low.
- As the number of 1 Gigabit customers grow the number of DOCSIS 3.1 capable modems (the ones doing 32X8) increases and the transition to DOCSIS 3.1 is already partially there ;-)
- Starting 1 Gigabit services on the DOCSIS 3.0 platform allows the ISP to replace current DOCSIS 3.0 only uBR10K infrastructure to cBR8 that can do both 3.0 and 3.1 at a steady and planned pace and then move to 3.1 when the time is right.

Thank you.

