Flaplist, Max CPE, & D3.0 VoIP

- Flaplist tracks US SM bursts
  - ✓Reason to use 16-QAM
- `cable modem max-cpe 10`
  - ✓Limits number of CPE hosts associated per CM
  - ✓Prevent attacker from obtaining very large amounts of IP addresses
  - ✓**Note**: May need 12 or more for multi-line eMTA
- D3.0 DS VoIP is bonded, which may cause DS latency or jitter
  - ✓Place voice call service flows on primary DS with:
    - ➢`cab docsis30-voice downstream req-attr-mask 0 forb-attr-mask 80000000`
  - ✓If D3.0 multi-line eMTAs used, this command may not be desirable since it will result in all DS voice flows on modem's primary DS ch
    - ➢Another good reason to have D3.0 Primary Distribution
  - ✓**Note**: US voice traffic is never bonded, nor are other scheduled flows

DOCSIS Load Balance & Load-Interval

- D3.0 LB follows fiber node configs
- DBC support added to LB D3.0 CMs across “like” BGs
  - ✓ `cable load-balance docsis30-enable`
- Dynamic D3.0 utilization LB added, even overlapping BGs
  - ✓ `cab load-balance docsis30-enable dynamic downstream`
- By default, cable, integrated, modular, wideband and other interfaces have default `load-interval 300`
  - ✓ 300 seconds used for statistics info can slow to react
  - ✓ Recommended to have lowest value of **30** sec so interface stats collected more frequently and more accurate to changes and/or traffic especially when it comes to features like load balancing

Suggested, Sample LB Config

```
cable load-balance docsis-enable
cable load-balance docsis30-enable
cable load-balance docsis30-enable dynamic downstream
cable load-balance modem max-failures 12
cable load-balance method-utilization min-threshold 60
cable load-balance rule 1 disable-throughput-lowerbound us 100
cable load-balance rule 2 disable-throughput-lowerbound ds 500
cable load-balance docsis-policy 1 rule 1
cable load-balance docsis-policy 1 rule 2
!
cable load-balance docsis-group <MD x/y/z> index <n>
 downstream Integrated-Cable A/B/C rf-channel <rfs>
 upstream Upstream-Cable X/Y/Z <USs>
 method utilization
 threshold load 15
 policy pure-ds-load
 init-tech-list 4
 docsis-policy 1
```

– Remove if doing modem method

- Configure `load-interval 30` everywhere
- "Anti-ping-pong" and `hold-down timer` features also added

Restricted Load Balance Group Example (85 MHz US)

- Assuming 8 US chs, USs 0-3 are < 42 MHz, 8-ch & 4-ch US BGs created
-
```
cable tag 1
 name 42MHz
 tlv ufrs 0 (1 means extended)
 docsis-version docsis20
```
-
```
cable load-balance docsis-group 10003
 restricted
 downstream Integrated-Cable 1/0/0 rf-channel 0-15
 upstream Upstream-Cable 1/0/0 us-channel 0-3
 tag 42MHz
```
- **Note**: Be sure D3.0 CMs placed in RLBGs have all DSs assigned for bonding
- **Note**: Verify proper tag was assigned after CM re-registration
  - ✓Tags are assigned from top down in show run and only one tag

Wideband Resiliency – DS Ch Bonding Partial Mode

- DS resiliency relies on CMs sending CM-STATUS messages to CMTS
- Global config to start processing cm-status messages and move ALL DS SFs to primary ch when impairment present
  - ✓`(config)#cab rf-change-trigger percent 50 count 10 secondary`
- Also have: `(config)#cable rf-change-dampen-time ?`
  - ✓`<1-65535>  # of seconds NP RF status change must persist`
- CM will report `p-online` and fwding interface gets changed
- Resiliency Bonding Groups (RBGs)
  - ✓`cable resiliency ds-bonding`
  - ✓`interface wideband-cable x/y/z:a`
    `cable ds-resiliency`

Modulation Profiles

```
Cab modulation-prof 222 atdma request 0 16  0 22 qpsk  scram 152 no-diff 32  fixed qpsk0 1 2048
Cab modulation-prof 222 atdma initial 5 34  0 48 qpsk  scram 152 no-diff 384 fixed qpsk0 1 2048
Cab modulation-prof 222 atdma station 5 34  0 48 qpsk  scram 152 no-diff 384 fixed qpsk0 1 2048
Cab modulation-prof 222 atdma a-short 4 76  7 22 qpsk  scram 152 no-diff 64  short qpsk0 1 2048
Cab modulation-prof 222 atdma a-long  9 232 0 22 qpsk  scram 152 no-diff 64  short qpsk0 1 2048
Cab modulation-prof 222 atdma a-ugs   9 232 0 22 qpsk  scram 152 no-diff 64  short qpsk0 1 2048

Cab modulation-prof 223 atdma request 0 16  0 22 16qam scram 152 no-diff 32  fixed qpsk1 1 2048
Cab modulation-prof 223 atdma initial 5 34  0 48 16qam scram 152 no-diff 384 fixed qpsk1 1 2048
Cab modulation-prof 223 atdma station 5 34  0 48 16qam scram 152 no-diff 384 fixed qpsk1 1 2048
Cab modulation-prof 223 atdma a-short 4 76  7 22 16qam scram 152 no-diff 64  short qpsk1 1 2048
Cab modulation-prof 223 atdma a-long  9 232 0 22 16qam scram 152 no-diff 64  short qpsk1 1 2048
Cab modulation-prof 223 atdma a-ugs   9 232 0 22 16qam scram 152 no-diff 64  short qpsk1 1 2048

Cab modulation-prof 224 atdma request 0 16  0 22 16qam scram 152 no-diff 32  fixed qpsk1 1 2048
Cab modulation-prof 224 atdma initial 5 34  0 48 16qam scram 152 no-diff 384 fixed qpsk1 1 2048
Cab modulation-prof 224 atdma station 5 34  0 48 16qam scram 152 no-diff 384 fixed qpsk1 1 2048
Cab modulation-prof 224 atdma a-short 6 76  6 22 64qam scram 152 no-diff 64  short qpsk1 1 2048
Cab modulation-prof 224 atdma a-long  9 232 0 22 64qam scram 152 no-diff 64  short qpsk1 0 2048
Cab modulation-prof 224 atdma a-ugs   9 232 0 22 64qam scram 152 no-diff 64  short qpsk1 1 2048
```

Note: Dynamic US interleave turned ON for a-long burst for more protection to impulse noise; if deemed unnecessary or causes problems, change 0 back to 1

Controller Upstream-Cable 1/0/0

```
us-channel 0 frequency 25000000
us-channel 0 channel-width 6400000 6400000
us-channel 0 threshold snr-profiles 24 19
us-channel 0 threshold corr-fec 0 (0 to turn off)
us-channel 0 threshold uncorr-fec 1
! This is default command, so won't show
us-channel 0 threshold hysteresis 4
us-channel 0 docsis-mode atdma
us-channel 0 minislot-size 2
us-channel 0 modulation-profile 224 223 222
us-channel 0 equalization-coefficient
no us-channel 0 shutdown
```

D3.1 DS

- DS guardband
- Mixed mod profiles
- Graceful profile management
  - ✓¼ dB MER and % exclude
- Corr FEC
- **Note**: OFDM time offset = 20x SC-QAM time offsets
  - ✓10.24 MHz vs 204.8 MHz clocking