One Mac Domain per Service Group (SG) vs Two

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Pros of One Mac Domain per SG

- Most efficient for D1.x & 2.0 load balance (LB)
  - ✓ Independent US and DS LB
    - ➢ This advantage diminishes with D1.x & D2.0 attrition
- Simplified config with minimal Cable Interfaces
- CLI Simplification feature supported

Cons of One Mac Domain per SG

- 16 USs allowed per domain
  - ✓ Issue with architectures of 1:4 and more than 4 USs per fiber node (FN) needed
  - ✓ Max of 12 SC-QAMs and 4 OFDMA per US Controller
- More USs in node = more UCDs & DS Map traffic
  - ✓ Typical .4 Mbps of DS overhead for each US
    - ➢ OFDMA US & LLD 1 ms Map idea will be worse
  - ✓ More UCDs can create longer registration
- 8175 SID limit per domain shared across all USs
  - ✓8192 total; SID 0 used for initial ranging and few on high side reserved

Pros of Two Mac Domains per SG

- Supported today
- Bonding across domains not an issue
- More SID space supported
  - ✓SIDs needed for DSG, D3.0 SID cluster 2, LLD PGS, UGS
    - ➢But not Multicast flows
- Less DS overhead since less USs & UCDs per domain
- Can support 1:4 architecture with 6 SC-QAM+2 OFDMA USs per FN

Cons of Two Mac Domains per SG

- Less efficient D1.x & D2.0 LB
  - ✓ Modems in certain FNs can't use all DS freqs
    - ➢ Maybe less of an issue with D2.0 attrition
- D3.0 primary distribution uneven (staggering DSs may help)
  - ✓ Resilient Bonding Group (RBG) affect?
- DSG box registration may act erratic
- More cable interfaces
  - ✓ cBR-8 supports 16 total cable interfaces with 32 planned for R-PHY
    - ➢ Matches US connectors/FNs
- UCDs from 2 domains may increase CM registration
  - ✓ DS freq override (DFO) should help
- May not be supported for CLI Simplification feature
- NB CMs (D1.x & 2.0) may get in bad cycle if primary goes down & DFO keeps pointing back to bad DS

8175 SIDs Per Domain Limit

- Talk to make per US or keep per domain and increase to 16K, but never went anywhere because too much work
- Spec says 8K “must” and 16K “may”
  - ✓ Gray area of spec doesn’t say per domain or per US
- Multicast does not count in that limit
- Every US SFID is unique SID
- US bonding “`sid cluster 2`” will exacerbate issue
  - ✓ Could drop to default of `dynamic` & increase cm file US Max Traffic Burst to 30 kB or more
- Some SFs are dynamic, so look for stale service flows
- DSG devices can really increase these SID numbers
- Even CMs offline hold onto SIDs
- `show interfaces Cable 1/0/0 sid | count enable`

2 Domain Example – **US0** Controller

```
• controller Upstream-Cable 1/0/0
 us-ch 0 frequency 20000000
 us-ch 0 channel-width 64 64
 us-ch 0 docsis-mode atdma
 us-ch 0 minislot-size 2
 us-ch 0 modulation-profile 224
 us-ch 0 equalization-coefficient
 no us-channel 0 shutdown
 us-ch 1 frequency 26400000
 us-ch 1 channel-width 64 64
 us-ch 1 docsis-mode atdma
 us-ch 1 minislot-size 2
 us-ch 1 modulation-profile 224
 us-ch 1 equalization-coefficient
 no us-channel 1 shutdown
 us-ch 2 frequency 32800000
 us-ch 2 channel-width 64 64
 us-ch 2 docsis-mode atdma
 us-ch 2 minislot-size 2
 us-ch 2 modulation-profile 224
 us-ch 2 equalization-coefficient
 no us-channel 2 shutdown
 us-ch 3 frequency 39200000
 us-ch 3 channel-width 64 64
 us-ch 3 docsis-mode atdma
 us-ch 3 minislot-size 2
 us-ch 3 modulation-profile 224
 us-ch 3 equalization-coefficient
 no us-channel 3 shutdown
```

2 Domain Example – US1 Controller

```
• controller Upstream-Cable 1/0/1
 us-ch 0 frequency 20000000
 us-ch 0 channel-width 64 64
 us-ch 0 docsis-mode atdma
 us-ch 0 minislot-size 2
 us-ch 0 modulation-prof 224
 us-ch 0 equalization-coefficient
 no us-channel 0 shutdown
 us-ch 1 frequency 26400000
 us-ch 1 channel-width 64 64
 us-ch 1 docsis-mode atdma
 us-ch 1 minislot-size 2
 us-ch 1 modulation-profile 224
 us-ch 1 equalization-coefficient
 no us-channel 1 shutdown
 us-ch 2 frequency 32800000
 us-ch 2 channel-width 64 64
 us-ch 2 docsis-mode atdma
 us-ch 2 minislot-size 2
 us-ch 2 modulation-profile 224
 us-ch 2 equalization-coefficient
 no us-channel 2 shutdown
 us-ch 3 frequency 39200000
 us-ch 3 channel-width 64 64
 us-ch 3 docsis-mode atdma
 us-ch 3 minislot-size 2
 us-ch 3 modulation-profile 224
 us-ch 3 equalization-coefficient
 no us-channel 3 shutdown
```

DS Controller & First Cable Interface

- controller Integrated-Cab 1/0/0
 max-carrier 16
 base-channel-power 42
 freq-profile 0
 rf-chan 0 15
  type DOCSIS
  frequency 453000000
  rf-output NORMAL
  power-adjust 0
  docsis-channel-id 1
  qam-profile 1

- interface Cable1/0/0
load-interval 30
 down Integrated-Ca 1/0/0 rf-ch 0
 down Integrated-Ca 1/0/0 rf-ch 2
 down Integrated-Ca 1/0/0 rf-ch 4
 down Integrated-Ca 1/0/0 rf-ch 6
 down Integrated-Ca 1/0/0 rf-ch 8
 down Integrated-Ca 1/0/0 rf-ch 10
 down Integrated-Ca 1/0/0 rf-ch 12
 down Integrated-Ca 1/0/0 rf-ch 14
 up 0 Upstream-Cable 1/0/0 us-ch 0
 up 1 Upstream-Cable 1/0/0 us-ch 1
 up 2 Upstream-Cable 1/0/0 us-ch 2
 up 3 Upstream-Cable 1/0/0 us-ch 3
 cab up balance-scheduling
 cab up max-channel-power-offset 6
 cab upstream bonding-group 1
  upstream 0
  upstream 1
  upstream 2
  upstream 3
  attributes 80000000
 cab bundle 1
 cab map-advance dynamic 600 600
 cab sid-cluster-gr num-of-clus 2
 cab sid-cluster-switch max-req 4
 cab privacy mandatory

Second Cable Interface

```
• interface Cable1/0/1
load-interval 30
 down Integrated-Ca 1/0/0 rf-ch 1
 down Integrated-Ca 1/0/0 rf-ch 3
 down Integrated-Ca 1/0/0 rf-ch 5
 down Integrated-Ca 1/0/0 rf-ch 7
 down Integrated-Ca 1/0/0 rf-ch 9
 down Integrated-Ca 1/0/0 rf-ch 11
 down Integrated-Ca 1/0/0 rf-ch 13
 down Integrated-Ca 1/0/0 rf-ch 15
 up 0 Upstream-Cable 1/0/1 us-ch 0
 up 1 Upstream-Cable 1/0/1 us-ch 1
 up 2 Upstream-Cable 1/0/1 us-ch 2
 up 3 Upstream-Cable 1/0/1 us-ch 3
 cab upstream balance-scheduling
 cab up max-channel-power-offset 6
 cab upstream bonding-group 1
  upstream 0
  upstream 1
  upstream 2
  upstream 3
  attributes 80000000
 cable bundle 1
 cab map-advance dynamic 600 600
 cab sid-cluster-gr num-of-clus 2
 cab sid-cluster-switch max-req 4
```

Integrated and Wideband Interfaces for 1/0/0

- interface Integrated-Cable1/0/0:0
  load-interval 30
  cable bundle 1
- interface Integrated-Cable1/0/0:1
  load-interval 30
  cable bundle 1

.....continue

- inter Integrated-Cable1/0/0:15
  load-interval 30
  cable bundle 1

- interface Wideband-Cable1/0/0:0
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 0-15 band 1
- interface Wideband-Cable1/0/0:1
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 0-7 band 1
- interface Wideband-Cable1/0/0:2
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 8-15 band 1
- interface Wideband-Cable1/0/0:3
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 0-3 band 1
- interface Wideband-Cable1/0/0:4
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 4-7 band 1
- interface Wideband-Cable1/0/0:5
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 8-11 band 1
- interface Wideband-Cable1/0/0:6
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 12-15 band 1

Integrated and Wideband Interfaces for 1/0/1

- interface Integrated-Cable1/0/1:0
  load-interval 30
  cable bundle 1
- interface Integrated-Cable1/0/1:1
  load-interval 30
  cable bundle 1

.....continue

- inter Integrated-Cable1/0/1:15
  load-interval 30
  cable bundle 1

- interface Wideband-Cable1/0/1:0
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 0-15 band 1
- interface Wideband-Cable1/0/1:1
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 0-7 band 1
- interface Wideband-Cable1/0/1:2
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 8-15 band 1
- interface Wideband-Cable1/0/1:3
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 0-3 band 1
- interface Wideband-Cable1/0/1:4
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 4-7 band 1
- interface Wideband-Cable1/0/1:5
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 8-11 band 1
- interface Wideband-Cable1/0/1:6
  load-interval 30
  cable bundle 1
  cab rf-ch channel-li 12-15 band 1

Fiber Nodes (FN)

- ```
  cable fiber-node 1
  downstream Integrated-Cable 1/0/0
  upstream Upstream-Cable 1/0/0
  ```

- ```
  cable fiber-node 2
  downstream Integrated-Cable 1/0/0
  upstream Upstream-Cable 1/0/1
  ```

- **Note**: By staggering DSs between mac domains, we get better distribution for D2.0 LB, D3.0 BG selection & LB, and maybe RBGs

- **Note**: Be careful with restricted LBGs for D3.0 CMs – all DSs for bonding must be in RLBG