EPoC RF Spectrum for FDD

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Ideal Objective

- EPoC FDD “upstream below downstream” operation can be provisioned for meeting international frequency range deployment requirements in:
  - North America
  - Europe
  - Japan
  - China / Asia

Consideration Summary

- FDD RF spectrum coverage:
  - Downstream: 54 MHz to 1212 MHz
  - Upstream: 5 MHz to 234 MHz
  - Operating assumption: OFDM 192 MHz “wide” channel(s) can be positioned within the bands with flexibility as desired by the cable operator
    - Subject of further work by Task Force
- Energy separation of DS / US overlap region of 42 MHz to ~292 MHz requires a diplexer
  - While specific diplexer requirements are for future study in CLT and CNU, having the protocol “aware” of the CNU diplexer configuration might be prudent. Also for further work.

References / Rationale

- Downstream: 54 MHz to 1212 MHz
  - 54 MHz – lowest frequency currently in use (North America)
  - 1212 MHz – appears to be a socialized upper end for 1200 MHz capable systems
- Upstream: 5 MHz to 230 MHz
  - 5 MHz lowest frequency currently in use anywhere in specifications
  - 234 MHz – highest upstream frequency pass band requirement requested to date (If 5-42MHz used by existing services, 42 + 192 = 234 MHz would be needed to add a full channel of EPoC)
    - http://www.ieee802.org/3/bn/public/may13/tanaka_3bn_01_0513.pdf
    - http://www.ieee802.org/3/bn/public/adhoc_eval/adhoc_eval_uematsu_01_0513.pdf

FDD Coverage Summary

International Region	Coverage Potential
North America DS: 54/108/252 MHz to 1212 MHz (existing / future) US: 5 MHz to 42/85/200 MHz (existing / future)	 Yes Yes
Europe DS: 108 MHz to 870 / 1002 MHz (existing) US: 5 MHz to 65 MHz (existing)	 Yes Yes
Japan: DS: 70 MHz to 770 / 1000 MHz (future to 2610 MHz) US: 10 MHz to 55 / 234 MHz (existing / future)	 Yes (70 – 1000 MHz) [Note 1] Yes
China / Asia: DS: 110 MHz to 860 MHz ("above 960 MHz" to 1200/1300 MHz) US: 5 MHz to 65 MHz	[Note 2] Yes [Note 3, 4, 5] Yes

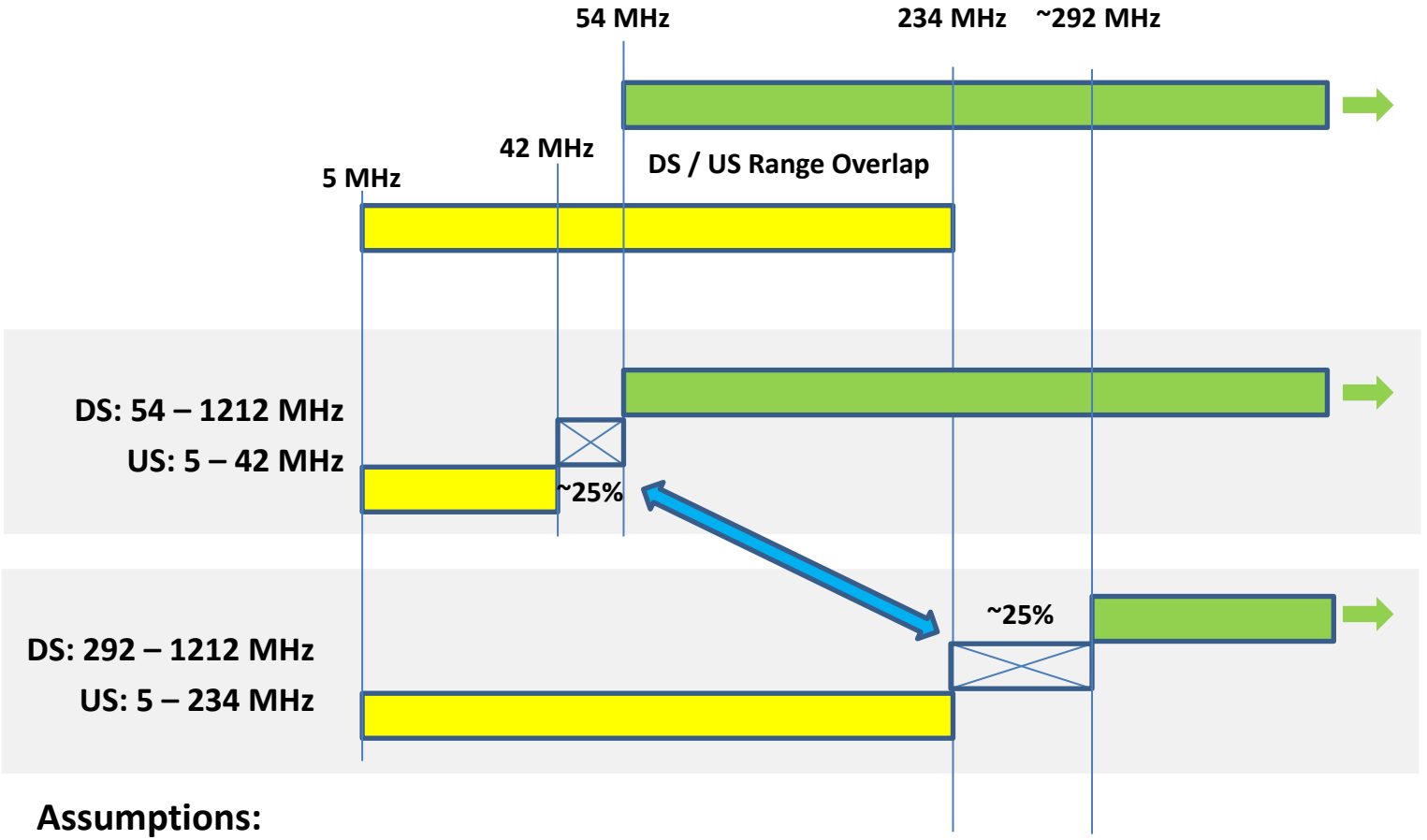
Note 1: Extending 1212 MHz to 2610 MHz needs further study (add not about power and rate limited)
2: http://www.ieee802.org/3/epoc/public/mar12/huang_01_0312.pdf
3: http://www.ieee802.org/3/bn/public/oct12/gao_01_1012.pdf
4: http://www.ieee802.org/3/bn/public/oct12/zhangdq_01_1012.pdf
5: http://www.ieee802.org/3/bn/public/oct12/yao_01_1012.pdf

Visual DS / US Overlap

- With the considered downstream and upstream frequency ranges
  - Overlap in 54 MHz to 234 MHz of operation regions

- Diplex filter required
  - Separation of downstream from upstream signal energy

Diplexer Impact on Frequency Range



- Assumptions:
  - Vendors will implement fixed diplexer specific to the region requirements
  - EPoC specifications should accommodate this regionalization
    - Architectural rules for sub-carrier use can be based on installed diplexer parameters – for further work

Conclusions

- Frequency range considerations in this presentation will meet known international EPoC band plan requirements
- Diplexer configuration is specific to implementation and regionalization
- The details on provisioning DS and US OFDM channel(s) within a frequency range is a separate work effort

Straw Poll

- The EPoC standard for FDD “upstream below downstream” operation will specify the following frequency ranges:
  - Downstream: 54 MHz to 1212 MHz
  - Upstream: 5 MHz to 234 MHz
- The DS / US overlap region will require a diplexer. The EPoC specification will accommodate regionalization.

- Yes / Agree:
- No / Disagree:
- Abstain:

Thank you