EPoC RF Bandwidth Task Force Choices

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Supporters

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- Jorge Salinger (Comcast)

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EPoC Objective #2

- Provide a physical layer specification that is capable of:
  - A baseline data rate of 1 Gb/s at the MAC/PLS service interface when transmitting in 120 MHz, or less, of assigned spectrum under defined baseline plant conditions;
  - A data rate lower than the baseline data rate when transmitting in less than 120 MHz of assigned spectrum or under poorer than defined plant conditions;
  - A data rate higher than the 1Gb/s baseline data rate and up to 10 Gb/s when transmitting in assigned spectrum and in channel conditions that permit.

Goal

- The goal of this presentation is to identify choices the Task Force needs to make regarding the EPoC RF Bandwidth

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Outline

- RF Bandwidths
- Required RF Bandwidth with Exclusion sub-bands Approach
- Choices to be made
  - List of Task Force Choices
  - Slides describing each of the Choices
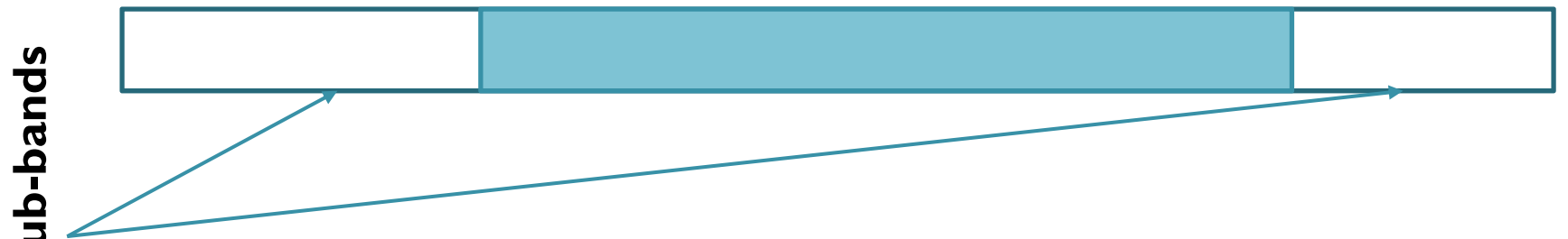
RF Bandwidths

- The standard should specify the RF bandwidth for any supported PHY modes. Possible modes could include the following,
    - FDD Downstream
    - FDD Upstream
    - TDD

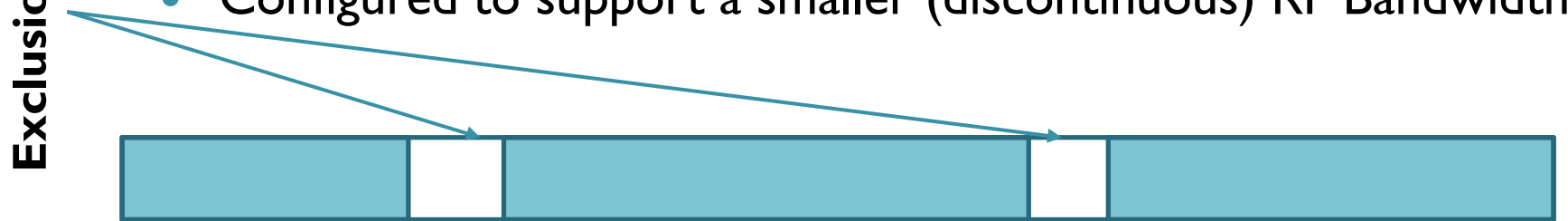# Required RF Bandwidth with Exclusion sub-bands Approach – Illustration

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Exclusion Sub-bands

- Required RF Bandwidth = $f_2 - f_1$

f_1 f_2

- Configured to support a smaller (continuous) RF Bandwidth

- Configured to support a smaller (discontinuous) RF Bandwidth

Required RF Bandwidth with Exclusion sub-bands Approach

- We recommend that the standard specify a Required RF Bandwidth for each PHY mode in the standard

- The standard should support smaller RF bandwidths by excluding portions of the Required RF Bandwidth

- This allows for RF bandwidths that are continuous and also RF bandwidths which consist of a set of discontinuous sub-bands

- The standard will need to specify the rules for exclusion sub-bands

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List of Task Force Choices

1. Specify the Required RF Bandwidth for each of the supported PHY modes
2. Specify the rules for exclusion sub-bands
3. Specify the out-of-band (OOB) emission requirements
4. Decide if the PHY will use absolute subcarrier frequencies

1. Required Bandwidth Decision

- Fill in the table below

	PHY Mode 1	PHY Mode 2	PHY Mode 3
Required RF Bandwidth(s)			

- The Task Force must choose one (or more) RF bandwidth for each PHY mode
  - The Task Force may support several data rate bandwidths (e.g. 1 Gb/s and 2 Gb/s) and hence may choose to support several RF bandwidths
- Additional rows can be added to this table to include other parameters like minimum and maximum operating frequency, etc.

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2. Rules for Exclusion Sub-bands

- Required RF Bandwidth

- Excluded a contiguous sub-band (e.g. 6 or 8 MHz)
  - Probably allowed

- Exclude multiple sub-bands of different RF bandwidths
  - Do we allow this?

- A few sub-bands, widely separated (adding up to required RF Bandwidth)
  - Do we allow this?

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2. Rules for Exclusion Sub-bands

- The standard will need to provide a set of rules specifying what exclusion sub-bands are allowed
- Example rules
  - All exclusion sub-bands are a multiple of 6 MHz
  - The remaining RF spectrum, after removing the spectrum of a set of exclusion sub-bands, consists of no more than three non-contiguous sub-bands
  - Etc.
- There at least three motivations for exclusion sub-bands
  - Less RF bandwidth is available than the Required RF bandwidth
  - There is a legacy service (e.g. DOCSIS) within the RF band, which must be protected
  - There is narrowband noise within the band

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3. Specify the out-of-band (OOB) emission requirements?

- Outside the RF spectrum and within some exclusion sub-bands, there will be legacy services

- The PHY needs to limit its out-of-band (OOB) emissions in those frequencies to avoid causing harmful interference to those legacy services

- The Task Force needs to specify OOB emission requirements that the PHY must meet, to avoid causing harmful interference

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4. Decide if the PHY will use absolute subcarrier frequencies

- Some systems specify the actual OFDM subcarrier frequencies all the way from DC (f=0) up to a very high upper frequency limit
  - As an example DVB-C2 specifies the exact OFDM subcarrier frequencies over the range from DC to approximately 3 GHz
- The Upstream and Downstream are specified by a subset of subcarrier frequencies

Conclusions

Task Force members should bring forward proposals on the following topics

1. Specify the Required RF Bandwidth for each of the supported PHY modes
2. Specify the rules for exclusion sub-bands
3. Specify the out-of-band (OOB) emission requirements
4. Decide if the PHY will use absolute subcarrier frequencies

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Ad Hoc – RF Bandwidth

- We request that the Task Force Chair establish an Ad Hoc committee on *RF Bandwidth*