

Questions on EPOC Technical Requirements

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Purpose of this Presentation

- In order to develop the EPOC standard the group needs to agree on a set of technical requirements
- We would like to agree on the set of technical requirements during the study group phase of the project (Jan – July)
- The presentation provides a number of questions regarding technical requirements
- We can discuss these questions, reword these questions or add additional questions
- In subsequent meetings submissions can be made on technical requirements and the study group can develop an agreed-upon set of technical requirements

Spectrum

- The standard will need to support multiple spectrum plans
 - Paired spectrum (FDD)
 - Unpaired spectrum (TDD)
 - Different bandwidths and center frequencies
 - Different operators will have different spectrum available and that spectrum availability may change in the future
- What bandwidths should the standard support?
 - FDD Upstream
 - FDD Downstream
 - TDD
- Should these bandwidths be multiples of a base bandwidth, to avoid unbounded flexibility?
- Should the standard specify center frequency or should that be left to the operator?
- Will the FDD upstream (downstream) spectrum be contiguous or in some cases noncontiguous?

Spectrum – Multiple of a Common BW

- EPOC spectrum may consist of unused TV channels on the coax cable
- Spectrum BW may be available in multiples of the TV channel bandwidth
- TV channel bandwidths are typically 6 or 8 MHz (in some limited regions they are 7 MHz)
- The least common multiple of 6 and 8 is 24
 - $\text{LCM}(6, 8) = 24$
- Should we make all EPOC bandwidths a multiple of 24 MHz (or 48 MHz) to support worldwide operation?

Spectrum – Examples of Common BW

- Example of using a common BW building block
- Should FDD downstream support 48, 96, 120, 144 ...MHz?
- Do some of these bandwidths make sense for TDD?
- This is one possible way of controlling the number of options, while supporting the necessary bandwidth flexibility
- Upstream may have different spectral limitations we need to consider

BWs Supported (MHz)
24
48
72
96
120
144
168
192
216
240

Cable Plant Characteristics

- The EPOC standard will need to be flexible so that it can operate on different cable plants
- However, too much flexibility can lead to a standard that is too broad and difficult to implement
- We need to agree on the range of plant characteristics the EPOC standard will support
- From a PHY design point-of-view this comes down to specifying communication channel characteristics
 - Downstream and Upstream Path Loss
 - Channel Power Delay Profile
 - Noise model
 - Etc.

Cable Plant Characteristics

- In the EPOC cable plant, what is physical distance from the CLT to the farthest CNU?
- Should the standard support different deployments with different physical distances?
 - For example, should the standard support relatively short-range deployments of 200 to 300 meters and also longer-range deployments of 1 to 2 km?
- Should the standard support both passive and active EPOC cable plants?
- From this cable plant information should the SG develop a set of channel models, including, SNR, delay spread, etc, which can be used in developing PHY proposals?

PHY Layer – Boundary Conditions

- The IEEE call-for-interest (CFI) refers to very high spectral efficiency
- What is the minimum spectral efficiency (b/s/Hz) the standard should support?
- What is the maximum spectral efficiency (b/s/Hz) the standard should support?
- Should each CNU be able to support the peak PHY rate or is it sufficient to have the CNU support a lower peak PHY rate as long as the overall network rate still meets its specified value?
- In cases of very large downstream BW (e.g. 240 MHz) the implementation complexity of an CNU that supports the entire downstream bandwidth may become excessive
- Is it acceptable for an CNU to support a bandwidth lower than the full bandwidth as long as the network throughput is maintained?

Coexistence with Existing Services

- EPOC will share the coax with other services, so we need to ensure that that implementations of the EPOC standard coexist with those services
- Is there an out-of-band (OOB) emissions requirement that needs to be met?
- Are there other requirements on coexistence with existing services?

Conclusions

- A number of questions regarding the EPOC technical requirements have been raised
- The study group needs to address these questions and agree on a set of technical requirements
- We recommend that that the study group agree on a set of channel models to support development of the PHY layer
- We are willing to contribute to both the technical requirements and channel model documents