Input text to the PAR and five criteria

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Mike Hart, Sunil Vadgama	Voice:	+44 20 8606 4523
Fujitsu Laboratories of Europe Ltd.	Fax:	+44 20 8606 4539
Hayes Park Central, Hayes, Middx.	E-mail:	mike.hart@uk.fujitsu.com
UK, UB4 8FE		

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    IEEE 802.16 Session #40, Vancouver, CANADA

Base Document:

    None

Purpose:

    Review and discussion within the 802.16 MMR study group and to assist in the drafting process of the PAR and five criteria.

Contents

- Scope of the project
- Text for PAR
  - Scope, Purpose, Reason
  - Additional explanatory notes (?)
- Text for five criteria
- Proposal

Project Scope – SG discussions so far

- Determine modifications to PMP mode of IEEE802.16e:
    - PHY (OFDM and OFDMA)
    - MAC

- Modifications should enable backwards compatibility
    - Any amendments to the standard will not preclude support of legacy devices

Project Scope – SG discussions so far

		Infrastructure	Client
Mesh		✘	✘
Relay	Fixed	✔	✔
	Nomadic	✔	✔
	Mobile	✔	✘

Definitions:

	Infrastructure	Client
Control/ownership	Operator	Subscriber (operator may have influence)
Power source requirements	High capacity	High capacity (fixed) or low capacity (fixed, nomadic, mobile)
Number of simultaneous relayed connections	No restriction	May be limited based on form factor, power source
Complexity	Less than BS	High capability SS or MS

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Scope

"This document provides enhancements to the MAC, OFDM PHY and OFDMA PHY of the IEEE Std 802.16 such that a fixed, nomadic and mobile relay station (RS) are defined and their operation enabled in a manner such that they are interoperable with existing IEEE Std 802.16 systems."

The above text does not explicitly state:

- Only for PMP mode
- Licensed/Unlicensed
- Different RS classifications
- Mobile RS cannot be a client
- Restrictions on capability/complexity
  - Channels, number of hops, etc.

Purpose

"The purpose of this project is to define the various RS types and the required amendment to the IEEE Std 802.16 standard to enable the RS operation such that they will enable coverage augmentation, throughput enhancement and/or increase in system capacity of an existing deployment."

Issues that will be solved within the project:

- Different RS classifications
- Restrictions on capability/complexity
  - Channels, number of hops, etc.
- Amendment to the standard to enable:
  - Coverage & throughput improvement
  - Possibly increase in the achieved system capacity

Reason

"It is well known that the use of an RS in an existing network can improve service coverage; simple RS are in use today that achieve such an objective. However, it is also known, through considerable research, that an RS can also provide a cost effective method for improving throughput and system capacity in an existing deployment as well as reducing transmit powers and consequently the level of interference. This project aims to enable exploitation of such advantages by adding appropriate relaying functionality to the existing IEEE Std 802.16 through the proposed amendment."

Not mentioned:

- System rollout/deployment advantages → in the 5 criteria

Explanatory Notes

- Nothing proposed in this contribution
- Could use this section to elaborate on the scope
    - Explicitly what is in scope
    - Explicitly what is out of scope

    For example:
      - Only for PMP mode
      - Licensed/Unlicensed
      - Different RS classifications
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1. Broad market potential

- Broad sets of applicability

  "The amendment will be applicable to the already existing IEEE Std 802.16 which itself already has a broad set of applicability, and through this amendment the applications of this standard will be further broadened due to the amendment enabling lower cost deployments and improved performance. This is because the amendment will provide a cost effective way to either improve throughput in a non-coverage limited scenario or considerable increase in range in a coverage limited scenario, thus increasing the performance and reach of the existing standard."

- Multiple vendors, numerous users

- Balanced costs

  "The relay station (RS) which will be introduced through the amendment will be of reduced complexity when compared to the basestation (BS). It is well known that it is possible to use cheaper RS's to improve coverage, throughput and system capacity as an alternative to using more costly BS's."

2. Compatibility

- Reference to the baseline standard

3. Compatibility

- Substantially different from other IEEE 802 standards

  "The only similar standards are the amendment being developed by TGs of the IEEE 802.11 Working Group and the already existing Mesh mode in the IEEE Std 802.16. However, these are limited only to mesh architecture and this amendment will develop a distinctly different, yet cost and performance-effective extension for the point to multi-point mode of the IEEE Std 802.16."

- One unique solution per problem

  "The amendment will provide a unique solution to the problem of increasing coverage and improving throughput in an easy to manage and cost effective manner."

- Easy for the document reader to select the relevant specification

4. Technical feasibility

- Demonstrated system feasibility

"The use of very basic relaying is already employed in many current deployments in order to provide coverage in areas that are otherwise uncovered. The fundamental theoretical benefits of relaying are well known and researched. Moreover, coverage-capacity performance of advanced relay systems, such as those proposed in this project, have been verified by means of system level computer simulation. Consequently, the feasibility of potential improvements that are offered by the use of relaying has been clearly demonstrated."

- Proven technology, reasonable testing

"The existing standard itself is already a proven and tested technology. The technology associated with the amendment is in use in a very basic and limited way today. This provides a practical foundation for the defining the proposed relay functionality."

5. Economic feasibility

- Reasonable cost for performance

  "RS stations will be of lower cost than a BS due to their lower complexity, however it is known that they will provide improved system performance and consequently can provide a more cost effective solution to improving system performance compared with deploying more basestations."

- Consideration of installation costs

  "RS stations will be much simpler to install than BS due to their smaller size, power consumption and the fact that they do not require separate backhauling. As they can incorporate intelligent algorithms such that once deployed they self-configure, the cost associated with planning a deployment of BS and/or RS is significantly reduced compared to an all BS deployment."

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Proposal to the SG

- Discuss the content proposed (and revise as required)

- Form a first draft based on combination of this text and PAR text proposals in other already available contributions

- Take time to review this draft document

- Complete revisions at next meeting (through comments & contributions)