- **IEEE 802.21 MEDIA INDEPENDENT HANDOVER**

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- Title: **802.21 Usage Model Aspects**

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- Abstract: An overview of standardization processes in different SDO's and 802.21 performance analysis issues

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802.21 Usage Model Aspects

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Structure of the presentation

- Background
  - An overview of standardization activities
    - IEEE, ITU, ETSI, ANSI, IETF...
    - Conformance activities
    - Interoperability activities
  - Challenges for 802.21
    - Flexibility - 'adding value'
    - Interoperability
    - Conformance
    - Confidence on the mechanisms in the standard

- What can be achieved by Usage Model activities and what are the goals

- References

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Background

- Standardization essentials in IEEE
    - IEEE standards are typically flexible, can be very complex, and are rich in capabilities and possibilities for the vendors to add value in their products
    - Are typically a list of requirements with very many options
    - Conformance testing not addressed (some exceptions exist)
    - Interoperability not addressed
    - The above, with the fact that the complexities of the standards are growing, has lead to problems, that are then being sorted out in external foras (WiFi Alliance, Wimax forum). These give guidance on the mandatory features that are required for interoperability and to gain a certificate

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Background

- Standardization essentials in ITU
    - Very broad range of standardization
    - Standards much more strict when compared to for example IEEE standards
    - Conformance testing addressed, eg in ITU-T X.29x series
    - Interoperability addressed
    - Standardization process can in some cases be slow, and implementation can be tough.

- Standardization essentials in ETSI
    - Very much similar to ITU standardization
    - Conformance testing and interoperability addressed
    - Standards are free

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Background

- Standardization essentials in ANSI
  - Very broad range of standards
  - Detailed Conformity Assessment activities
  - Detailed procedures for standardization activities, and ensuring high quality of the standards

- Standardization essentials in IETF
  - RFC 2026 – 'the internet standards process – revision 3' explains the details
  - Vast majority of the outcome is RFC:s, which in some cases lead to an internet standard STD
  - An extract of chapter 4.1.2 in RFC 2026: 'A specification from which at least two independent and interoperable implementations from different code bases have been developed, and for which sufficient successful operational experience has been obtained, may be elevated to the "Draft Standard" level'

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Background

- Challenges for 802.21
  - Flexibility - 'adding value'
    - IEEE 802.21 is developing standards to enable handover and interoperability between heterogeneous network types including both 802 and non 802 networks
    - The non 802 networks are standardized in other SDO's, and can have different opinions of the 'adding value' – liaisoning challenge
  - Interoperability
    - The amount of enrichment capabilities is related to the amout of options in each supported technology, which are already huge
    - Is a 'handover alliance' an option?
  - Conformance
    - What is the mandatory part of the 802.21, should the standard explicitly state this, or is it left for external bodies to find out? Interpretation of the standard – will 802.21 overload IEEE Standards Interpretation?

Background

- Challenges for 802.21, cont
  - Confidence on the mechanisms in the standard
    - Handover in a heterogeneous network is a complex task, at some cases no experience available from existing systems
    - Radio propagation characteristics challenges can be easily underestimated
    - How to avoid unwanted network behaviour if some of the parameters are adjusted in an unoptimal way, what are the critical parameters?
    - Feasibility of the standard?
    - Interoperability questions vs 'adding value'
    - Handover is a 'standard basic' feature – so it must work, to add value on how well and effectively it works is an example where the vendors can differentiate.

Usage Model

- What can be achieved by Usage Model activities and what are the goals?
  - By defining a model (traffic, network topology, mobility, architectural elements, case scenarios and relevant parameter sets) and using it in eg. Simulations, will help the standardization in several ways:
    - Confidence on the concept and main mechanisms
    - Make it possible to split the relevant elements in heterogeneous handovers in smaller and more easier manageable parts, reality check
    - Higher quality on the normative text of the standard
    - Better knowledge on the parameters and their influence
    - Feasibility of the standard is better understood
    - Interoperability questions can be addressed early, in eg. as a basic 'system profile' that could be published as part of the standard
    - Ease the liaisoning with external SDO's – and thus add value to the 802.21 standard
    - Already the planning of such an activity could improve the accuracy of the voting process within the group, so there is synergies to do it in parallel with the down selection of the proposals.

Usage Model

- Some examples of utilizing usage/channel models in standardization
  - 802.16
  - 802.11n
  - 802.20
  - 3GPP

- What are the elements in a Usage Model
  - Applications and traffic, and the relevant parameters involved (Voice, Video, Data, QoS, latency, bandwith, etc) and how critical the parameters are
  - Network topologies and configuration, architectural concepts, characteristics of the radio propagation in each technology, power budgets, cell sizes, security issues etc.
  - Mobility aspects of the supported technologies
  - Parameter sets for the above
  - Analytical/simulation/real life test system approach can be used, depending on ambition level and available resources

References, informational

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