5 Criteria- P802.22, Revision to IEEE Std. 802.22-2011

1. Broad Market Potential

a) Broad sets of applicability

The proposed revision will enable a number of new broadband applications in bands that allow spectrum sharing such as television white spaces (TVWS). The revision will enable 802.22 networks to be deployed to provide broadband services and monitoring applications.

b) Multiple vendors and numerous users

It is expected that this revision will be applicable in all markets where the 802.22 technology will be used. The new features of the revision are expected to bring new equipment vendors.

c) Balanced costs (LAN versus attached stations)

It is expected that the new features of the revision can be implemented with reasonable cost resulting in overall better value.

2. Compatibility

The revision will be compatible with IEEE 802 family of standards, specifically 802 overview and architecture, 802.1 including 802.1D and 802.1Q.

3. Distinct Identity

a) Substantially different from other IEEE 802 standards

There is no other IEEE 802 standard or project, for combined broadband services and monitoring applications aimed at wireless regional area networks using television white space bands. The new revision PAR also proposes additional capabilities that will allow it to operate in bands that allow spectrum sharing. Spectrum may be shared with a wide range of services such as TV Broadcasting Services and in other bands that Governments have identified for spectrum sharing etc.

b) One unique solution per problem (not two solutions to a problem)

Combined broadband services and monitoring applications for wireless regional area networks by using television white space bands are not currently considered by any other wireless standard or project. The new revision PAR also proposes additional capabilities that will allow it to operate in bands that allow spectrum sharing. Hence, this offers a unique solution.

c) Easy for the document reader to select the relevant specification

Yes, since the proposed standard will produce a revision to the IEEE std. 802.22-2011.

4. Technical Feasibility

a) Demonstrated system feasibility

TVWS regulations are being formulated in various regulatory domains. Overall testing and certification programs for the WhiteSpace Devices are being defined. Experimental licenses for the WhiteSpace devices are being issued and trials, pilots and deployments of the WhiteSpace devices have begun.

Many companies are currently working on their IEEE 802.22 prototypes and products. Some such announcements for 802.22 can be found in [1] and [2].

b) Proven technology, reasonable testing

The PHY and MAC technologies used in 802.22, such as OFDMA for PHY and TDMA for MAC, have been thoroughly tested and commercially deployed by other IEEE 802 standards. Cognitive radio technology features to fulfil the requirements to operate in TVWS bands are being tested for compliance with requirements of various regulatory organizations (e.g., Federal Communications Commission (FCC), USA, Infocomm Development Authority (IDA), Singapore, OfCom, UK etc.) [3].

The testing program for WhiteSpace devices and databases have been established by various regulatory domains such as the Federal Communications Commission. Other alliances and industry consortiums such as the WhiteSpace Alliance are working on 802.22 (Wi-FAR™) inter-operability specification, compliance, testing and certification procedures.

c) Confidence in reliability

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The PHY and MAC technologies used in 802.22 such as OFDMA for PHY and TDMA for MAC, have been deployed by other IEEE 802 standards. Cognitive radio technology features to fulfil the requirements to operate in TVWS bands are being tested for reliability and for compliance with requirements of various regulatory organizations (e.g., Federal Communications Commission (FCC), USA, Infocomm Development Authority (IDA), Singapore, etc.) [3].

Research and regulatory inquiries are on-going to explore the possibility of using newer bands that could potentially be allowed for spectrum sharing.

d) Coexistence of 802 wireless standards specifying devices for unlicensed operation

This revision supports mechanisms to enable coexistence with other 802 systems in the same band. A coexistence assurance document will be produced by the WG as a part of the WG balloting process.

5. Economic Feasibility

a) Known cost factors, reliable data

IEEE 802.22 uses OFDMA for PHY and a TDMA based MAC. The cost factors to implement an OFDMA PHY and TDMA based MAC are well known today. The mandatory cognitive radio features such as access to database can be easily implemented in software. Other cost factors such as geolocation based on global positioning system (GPS) technology are well known.

b) Reasonable cost for performance

The IEEE 802.22 systems are designed for operation in rural areas where the population density is likely to be low. However, an IEEE 802.22 base station (BS) covers a large area typically with 30 km radius implying a reasonable cost per geographical unit of coverage. The CPEs are expected to be inexpensive and hence cost for overall network performance would be reasonable.

Also, since 802.22 systems will operate in bands that allow spectrum sharing, the cost of spectrum is expected to be fairly low, and hence resulting in a reasonable cost for performance.

c) Consideration of installation costs

Installation costs will be those of the updated base standard and are expected to be reasonable.

References

[1] World's First TV White Space Prototype Based on IEEE 802.22 for Wireless Regional Area Network: http://www.prnewswire.com/news-releases/worlds-first-tv-white-space-prototype-based-on-ieee-80222-for-wireless-regional-area-network-188002621.html

[2] Carlson Wireless: http://urgentcomm.com/networks_and_systems/news/carlson-white-space-radio-20110825/

[3] Singapore TV White Space Trials: https://mentor.ieee.org/802.22/dcn/11/22-11-0138-00-rasg-singapore-tvws-trial-publication.pdf