**PAR FORM- P802.22.1a, Amendment to IEEE Std. 802.22.1-2011**

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**Type of Project:** Amendment to IEEE Standard 802.22.1-2010

**1.1 Project Number:** P802.22.1a  
**1.2 Type of Document:** Standard  
**1.3 Life Cycle:** Full Use

**2.1 Title:** Standard for Information Technology--Telecommunications and information exchange between systems--Local and metropolitan area networks--Specific requirements Part 22.1: Standard to Enhance Harmful Interference Protection for Low-Power Licensed Devices Operating in TV Broadcast Bands Amendment: Advanced beaconing for spectrum sharing with radars, fixed or mobile space to earth stations, RF sensors, mobile, nomadic, transportable systems and other services

**3.1** **Working Group:** Wireless Regional Area Networks Working Group (C/LM/WG802.22)  
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**3.2** **Sponsoring Society and Committee:** IEEE Computer Society/LAN/MAN Standards Committee (C/LM)  
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**4.1 Type of Ballot:** Individual  
**4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot:** 11/2014  
**4.3 Projected Completion Date for Submittal to RevCom:** 05/2015

**5.1 Approximate number of people expected to be actively involved in the development of this project:** 20  
**5.2.a. Scope of the complete standard:** This standard specifies methods to provide enhanced protection to protected devices such as those used in the production and transmission of broadcast programs [e.g., devices licensed as secondary under Title 47 of the Code of Federal Regulations (CFR) in the USA and equivalent devices in other regulatory domains] from harmful interference caused by license-exempt devices (e.g., IEEE P802.22) that also are intended to operate in the TV Broadcast Bands.  
  
**5.2.b. Scope of the project:** This amendment specifies alternate Physical Layer (PHY) and enhancements to the Medium Access Control Layer (MAC) to the IEEE Std. 802.22.1-2010 for operation in Very High Frequency (VHF), Ultra High Frequency (UHF) and the S-Band (for example, 54MHz to 862 MHz and 2 GHz - 4 GHz) to support advanced beaconing standard for the protection and spectrum sharing of Part 74 and other types of devices, such as radars, fixed or mobile space to earth stations, RF sensors, mobile, nomadic, transportable systems and other services. This amendment provides an interface between the beaconing receiver and existing communications equipment in these bands to enable efficient spectrum sharing. The amendment makes modifications to the Functional Overview, PHY, and MAC clauses of the standard. It also adds a new clause related to the network of beacons that can receive in addition to transmitting, in order to detect other beacons and enable features such as Built in test (BIT) mode. The amendment specifies mesh and self organizing network capability and spectrum management techniques to guide the communications equipment as well as the beacons to use empty frequency bands, time-slots etc. to allow communications in-spite of a high power primary user services such as radar operation in the vicinity. This amendment will enhance the security features contained in IEEE Std. 802.22.1-2010 in order to allow secure transfer of primary user parameters to the communications equipment. This amendment supports mechanisms to enable coexistence with other 802 systems in the same band.  
  
**5.3 Is the completion of this standard dependent upon the completion of another standard:** No

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| **5.4 Purpose:** The purpose of this amendment is to create an advanced beaconing standard for protection and spectrum sharing with radars, fixed and mobile space to earth stations, RF sensors, mobile, nomadic, transportable systems and other services . The beacon may also be used for other applications such as search and rescue, geo caching etc. |  | **Changes in purpose:** This standard provides a standard and efficient method for license-exempt devices to provide enhanced protection to low-powered licensed devices that are entitled to protection from harmful interference, and that share the same spectrum. This standard may be applicable in global regulatory environments. |

**5.5 Need for the Project:** In June 2010, the President signed a Memorandum calling for the National Telecommunications and Information Administration (NTIA), in collaboration with the Federal Communications Commission (FCC), to make 500 megahertz of spectrum available for fixed and mobile wireless broadband. One of the portions of the spectrum identified to achieve this goal is the 100 megahertz of spectrum between 3550-3650 MHz where radars have been deployed. The plan is to use exclusion zones to protect U.S. Navy coastal operations and other Department of Defense test and training areas. Advanced beaconing approaches, such as the one developed in the IEEE Standard 802.22.1-2011 for spectrum sharing and interference protection between the primary signals and commercial wireless microphone signals may be used for the 3550-3650 band. Such an advanced beacon, will make 100 MHz of spectrum available nation-wide, and especially in the coastal areas where significant US population resides. The designed beacon will contain peace time temporal patterns of the radars (e. g. PW, PRI), which when combined with some universal time clock such as GPS can help commercial communications systems to use the empty time slots for their operation. During emergency scenarios, the beacon will be able to send urgent messages, to ask all the commercial systems to shut down immediately. Security features for such beacons are very important. IEEE Std, 802.22.1-2010 has incorporated many such security mechanisms that may be applied for the protection relatively readily. However, the IEEE Std. 802.22.1-2010 beacon requires alternate technologies for the PHY and enhancements to the MAC in order to carry the information for spectrum sharing. It also requires additional security attributes, as well as network self organization and spectrum management attributes to fulfil its duties. This advanced beaconing technology may be used to protect other types of services such as the satellite earth stations, search and rescue and novel applications such as geocaching, policy beaconing etc. Hence the need for this amendment.  
  
**5.6 Stakeholders for the Standard:** Chip and equipment manufacturers, government organizations, Department of Defence personnel, broadcasters, utility companies, wireless internet and data service providers and other entities such as database service providers to which the standard may need to interface.

**Intellectual Property**  
**6.1.a. Is the Sponsor aware of any copyright permissions needed for this project?:** No  
**6.1.b. Is the Sponsor aware of possible registration activity related to this project?:** No

**7.1 Are there other standards or projects with a similar scope?:** No  
**7.2 Joint Development**  
   **Is it the intent to develop this document jointly with another organization?:** No

**8.1 Additional Explanatory Notes (Item Number and Explanation):**