Project	**IEEE 802.16 Broadband Wireless Access Working Group**
Title	**Draft PAR for Broadband Wireless Systems Operating Below 10 GHz - Five Criteria**
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Re:	IEEE 802.16 Broadband Wireless Access Project Authorization Request (sub10 GHz)
Abstract	During the November 1999 IEEE 802.16 Closing Plenary a Study Group was formed to investigate establishing air interface specifications for Broadband Wireless Access at freque below 10 GHz. The Study Group's goal is to study and then submit a Project Authorization Request, if deemed necessary.
Purpose	Submit a draft of the five criteria for the draft PAR to the Study Group for review, comment completion.
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Rationale for a Broadband Wireless Access Air Interface Standard

For Frequencies below 10 GHz:

Meeting the Five Criteria

1. Broad Market Potential

A standards project authorized by IEEE 802 shall have a broad market potential. Specifically, it shall have the potential for:

a) Broad sets of applicability

Access networks in the microwave region are a rapidly emerging technology on a worldwide basis. Such networks have the potential to compete with copper- and cable-based systems in terms of capacity, and they offer the advantage of not requiring the installation of buried or pole-based infrastructure. This is particularly advantageous in countries where the infrastructure is not widely deployed. In the US, the recent action by the FCC to permit two-way operation in the MMDS frequency bands testifies to the level of interest in providing communication facilities based on broadband wireless. For example, WorldCom and Sprint just recently purchased a significant number of these frequencies in the US. Similar allocation of frequencies in the microwave region (below 11 GHz) is occurring in many other countries with attendant interest by potential operators.

b) Multiple vendors and numerous users

The interest of many vendors and users is attested by the membership of the 802.16 Working Group Study Group on Broadband Wireless Access below 10 GHz. xx members, representing over yy companies, participated in the Study Groups initial meeting (see Appendix A). Additional zz members, unable to attend the initial meeting, also expressed interest in the group. Two of the attending Companies are wireless trade associations representing many more Companies.

Although broadband wireless access networks have only recently been deployed, many users are already on-line using proprietary systems. For example, one service provider in the US currently has facilities operating in over 40 cities.

c) Balanced costs (LAN versus attached stations)

Given that a base station in a point-to-multipoint network can serve many user stations, and a

single user station can serve one or many users in the building, the cost of the equipment can easily be amortized over many users. Typically it will represent a small fraction of the total investment in computing and telecommunications hardware.

2) Compatibility

IEEE 802 defines a family of standards. All Standards shall be in conformance with the IEEE 802.1 Architecture, Management and Interworking documents as follows: 802 Overview and Architecture, 802.1D, 802.1Q and parts of 802.1f. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with 802.

Each standard in the IEEE 802 family of standards shall include a definition of managed objects that are compatible with systems management standards.

The proposed standard will conform to the 802 Functional Requirements Document, with the possible exception of the Hamming distance.

3. Distinct Identity

Each 802 standard shall have a distinct identity. To achieve this, each authorized project shall be:

a) Substantially different from other IEEE 802 standards.

The BWA standard occupies a distinct place in the family of standards. It is intended to provide for public access networks operated by a third party, where the user typically makes use of a wide-area network through an access network. It differs also from a wireless LAN, which typically is operated by a single organization over smaller distances and has less-stringent requirements for system integrity and resistance to unauthorized usage.

The access network is optimized for distances comparable with the propagation of microwave and millimeter waves through the atmosphere, which typically limits the distance between base stations and users to metropolitan dimensions. The new air interface specification for Access Systems operating below 11 GHz is expected to differ from the 802.16.1 air interface specification currently under development for LMDS frequencies due to differing target markets, RF spectrum, regulatory requirements and propagation conditions.

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

It is envisioned that the standard will provide protocols sufficiently flexible to provide efficiently for a variety of services, some of which may have stringently bounded delay requirements. Hence it will not be necessary to have a multiplicity of different and incompatible versions. An effort will be made to create a common MAC specification for both the low and high frequency PHY specifications.

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

It is anticipated that the document will be easily understandable for any reader attending IEEE

802.16 meetings.

4) Technical feasibility

For a project to be authorized, it shall be able to show its technical feasibility. At a minimum, the proposed project shall show:

a) Demonstrated system feasibility

The feasibility of such systems has been demonstrated by proprietary systems covering some if not all of the capability intended for this standard and now going into operation in many cities worldwide.

b) Proven technology, reasonable testing

The radio technology in microwave systems has been demonstrated for decades in both point-to-point and point-to-multipoint systems, as used in commercial and military environments. Many systems are now in commercial use.

c) Confidence in reliability

Commercial deployment of point-to-point and point-to-multipoint systems at microwave frequencies by carriers is evidence of proven reliability.

5) Economic feasibility

a) Known cost factors, reliable data

The economic feasibility of the equipment has already been demonstrated at the level of proprietary systems now going into operation. The willingness of investors to spend large sums to acquire spectrum rights, plus the large additional investment required for hardware in public networks, attests to the economic viability of the wireless access industry as a whole.

b) Reasonable cost for performance.

The use of such methods as point-to-multipoint communication provides substantial economies relative to earlier point-to-point technologies, particularly in handling data, which is characterized by high peak demands but bursty requirements overall. As demonstrated in many IEEE 802 standards over the years, such shared-media systems effectively serve users whose requirements vary over time, within the constraints of the total available data rate. The cost of a single base station is amortized over a large number of users.

c) Consideration of installation costs.

Installation of any wireless customer-site system is relatively simple in that no offsite cabling need be installed. In contrast, with wireline networks the plant expense to connect the customer to the network is a very substantial part of the total cost and must be incurred for the first user in

a coverage area. With wireless, the expenses can be incurred as customers come on-line. The siting of base stations is a more complex issue, but since one base station supports many users; the costs involved are very nominal on a per-user basis.

Appendix A:
The 802.16 Working Group Study Group on Broadband Wireless Access below 10 GHz

The Working Group Study Group had xx Members (from yy companies), whom attended the January 10-11, 2000 meeting in Richardson, Texas. See the Membership List.