IEEE P802.11
Wireless LANs

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| A CSD Proposal for BCS |
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# 1. IEEE 802 criteria for standards development (CSD)

The CSD documents an agreement between the WG and the Sponsor that provides a description of the project and the Sponsor's requirements more detailed than required in the PAR. The CSD consists of the project process requirements, 1.1, and the 5C requirements, 1.2.

## 1.1 Project process requirements

### 1.1.1 Managed objects

Describe the plan for developing a definition of managed objects. The plan shall specify one of the following:

1. The definitions will be part of this project. **YES**
2. The definitions will be part of a different project and provide the plan for that project or anticipated future project.
3. The definitions will not be developed and explain why such definitions are not needed.

### 1.1.2 Coexistence

A WG proposing a wireless project shall demonstrate coexistence through the preparation of a Coexistence Assurance (CA) document unless it is not applicable.

1. Will the WG create a CA document as part of the WG balloting process as described in Clause 13? **No**
2. If not, explain why the CA document is not applicable.

A CA document is not necessary for this amendment. It will change neither the IEEE 802.11 channel access mechanism nor physical layer operation in such a fashon to impact coexistence with other IEEE 802 standards specifying unlicensed operation.

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## 1.2 5C requirements

## 1.2.1 Broad Market Potential

Each proposed IEEE 802 LMSC standard shall have broad market potential. At a minimum, address the following areas:

a) Broad sets of applicability.

The number of mobile devices designed and built to the IEEE 802.11 specification is continuously increasing. The demand for mobile communications is expected to increase at nearly 50% per year according to the Cisco Visual Networking Index [1]. The outdoor Wi-Fi market is expected to grow 14% according to the Mordor Intelligence report [2].

The increasing IEEE 802.11 devices cause channel congestion, especially at a crowded area. Broadcast service is expected to provide benefit for all IEEE 802.11 devices, as it can reduce traffic on a channel by replacing frequently accessed information to broadcast.

On the other hand, for potential broadcast service providers, there are no existing method to broadcast at low cost, unlicensed. Many potential broadcast service providers are expected [3][4].

The receiver of the broadcast service is expected that it never transmits frames. A receiver (never transmits radio wave) is free to use in most countries.

b) Multiple vendors and numerous users.

Wide variety of chipset vendors currently build various IEEE 802.11 chipset. Significant variety of set makers also build various IEEE 802.11 capable devices, such as APs, smartphones, tablets and PCs. They are expected to implement IEEE 802.11 broadcast service.

Stakeholders include chip makers, set makers, system integrators, telecom operators, transportation industries and store operators.

## 1.2.2 Compatibility

Each proposed IEEE 802 LMSC standard should be in conformance with IEEE Std 802, IEEE 802.1AC, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 WG prior to submitting a PAR to the Sponsor.

1. Will the proposed standard comply with IEEE Std 802, IEEE Std 802.1AC and IEEE Std 802.1Q? **YES**
2. If the answer to a) is no, supply the response from the IEEE 802.1 WG.

The review and response is not required if the proposed standard is an amendment or revision to an existing standard for which it has been previously determined that compliance with the above IEEE 802 standards is not possible. In this case, the CSD statement shall state that this is the case.

## 1.2.3 Distinct Identity

Each proposed IEEE 802 LMSC standard shall provide evidence of a distinct identity. Identify standards and standards projects with similar scopes and for each one describes why the proposed project is substantially different.

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The proposed amendment is an amendment to the IEEE 802.11 specifications.

There are no approved IEEE 802 projects addressing broadcast services for IEEE 802.11 devices. ~~for public use~~ ~~with per frame sender authentication~~.

~~Existing broadcast mechanism in IEEE 802.11 is limited to use within a GTKSA. It uses symmetric algorithm and the key is shared by all stations in the GTKSA. This will cause fake-AP attack in public use that means untrusted user will join. The proposed amendment will define secure broadcast mechanism that supports at least authentication of the sender.~~

 ~~The broadcast service is a data distribution service from a single transmitter to multiple receivers.~~

## 1.2.4 Technical Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence that the project is technically feasible within the time frame of the project. At a minimum, address the following items to demonstrate technical feasibility:

a) Demonstrated system feasibility.

Hardware components, such as IEEE 802.11 chipset, are available today. Modifications to the exsiting IEEE 802.11 MAC are ~~easily~~ implemented by modifying driver software.

Possible solutions on how to achieve the envisioned functionality have been presented in IEEE 802.11 BCS SG. Basic concept is to use public key algorithm to provide per frame authentication [5]. Because all broadcast frames from AP are authenticated and the receivers never submit frames to the AP, existing IEEE 802.11 authentication and association can be skipped.

The latency of data transfer is expected to be reduced. While data is transferred to STAs sequentially by unicast, data is transferred simultaneously by broadcast.

The air time consumption is also expected to be reduced.

b) Proven similar technology via testing, modeling, simulation, etc.

The main components of the technology and signalling are in use today. Hence, the involved testing overhead associated with a commercial development undertaken by manufacturers is reasonable.

The amendment will use modeling and simulation as tools for evaluating performance metrics as necessary.

**1.2.5 Economic Feasibility**

Each proposed IEEE 802 LMSC standard shall provide evidence of economic feasibility. Demonstrate, as far as can reasonably be estimated, the economic feasibility of the proposed project for its intended applications. Among the areas that may be addressed in the cost for performance analysis are the following:

a) Balanced costs (infrastructure versus attached stations).

~~Modifications to provide broadcast services are not expected to significantly affect the cost of the infrastructure and the stations, as the hardware (PYH) component are expected to be left unchanged and only the modifications to the software are expected.~~

~~The expected additional cost is a fixed initial developing and testing cost for the software.~~

The amendment will not change the existing balance with infrastructure versus attached station, with the exception of opening up a new class of cheap receiver only devices.

The energy consumption of the receiver only devices will be apparently reduced, as they do not need to transmit any frames.

1. b) Known cost factors.

~~Support of the proposed standard will require manufacturers to modify the MAC functionality. The cost factor involved with such modifications is well known and the data for this is well understood.~~

It does not significantly change the existing 802.11 known cost factors except receiver only devices.

The receiver only devices may reduce the cost by removing transmitter.

c) Consideration of installation costs.

~~For some configurations and use cases, installed devices will benefit from offering broadcast service. Costs for adding broadcast service to an existing, deployed device are comparable to the cost of updating the firmware. The cost factors for such transition are known and well understood.~~

Installation costs are unchanged from those for existing IEEE 802.11 devices.

d) Consideration of operational costs (e.g., energy consumption).

~~In crowded eenvironment, the energy consumption of base stations is expected to be reduced, as multiple unicast streams are replaced by a single broadcast stream.~~

~~The energy consumption of stations will be apparently reduced, as they does not need to transmit any frames.~~

Operation cost is expected to be the same as existing 802.11 devices. In addition, using BCS may reduce energy consumptions at both the AP and the STAs.

1. Other areas, as appropriate.

**References:**

1. Cisco Visual Networking Index: Forecast and Methodology, 2016–2021 White Paper, available <https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/complete-white-paper-c11-481360.html>
2. Outdoor Wi-Fi Market - by Products and Services, by Implementation models, by End-user Industry, and Geography - Growth, Trends and Forecasts (2018 - 2023), available <https://www.mordorintelligence.com/industry-reports/outdoor-wi-fi-market>
3. Some Use Cases for Broadcast Services over WLAN, available <https://mentor.ieee.org/802.11/dcn/18/11-18-0561-00-0bcs-some-use-cases-for-broadcast-services-over-wlan.pptx>
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