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**IEEE 802.11**  
**Wireless Access Method and Physical Specification**

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**Title:** 802.11 MAC Requirements and Comparison Criteria.

**Presented by:**

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**Abstract:** This paper discusses the "User Requirements" for a Wireless MAC, and arrives to a list of comparison criteria, on which existing and future 802.11 MAC proposals should be judged.

**Introduction:**

This paper intends to give a list of the requirements that an 802.11 MAC should support, together with related Comparison Criteria. It can be used as a checklist to guide in the comparison of different protocols.

**Required MAC services:**

The following services need to be provided:

- An asynchronous Bursty traffic service.
  - 802 LLC services should be provided
    - . Unicast transfer mode.
    - . Broadcast/Multicast transfer mode.
    - . Meet the reliability requirements (with possible exception for Broadcasts)

Note: Different service levels may be specified.

- An Isochronous (Time Bounded Service)
  - . Should be designed to be an option.
  - . Should be dimensioned to support Voice.

**Related Questions:**

- . Different service levels may be specified.
- . What are the limitations applicable to support the Isochronous service.
- . Does the MAC offer mixed Isochronous/Asynchronous capability.
- . What is the burden on Asynchronous implementation complexity.

### **Support Infrastructure based Multiple Cell Networks**

The connectivity options that are possible within the total architecture should be made clear. Global connectivity requirements are:

- Peer-to-Peer within the BSA.
- Peer-to-Peer between different BSA's.
- Connectivity with existing wired network implementations.

Related questions:

- Is Direct Peer-to-Peer supported in Infrastructure mode.
- Can an Ad-Hoc network overlap in the same channel.

### **Infrastructure considerations:**

- Can any 802 compatible LAN be used as the Distribution system.
- What are the supported configurations.
- What are the unique functions needed from the Distribution system.
- What are the limitations for different supported configurations.
- What are the provisions to support "Re-association" across Routers and Bridges and Gateways.
- What is the throughput performance per station across the Distribution system, and what are the factors that determine this.
- What is the required infrastructure for the Time Bounded Services

### **MAC should be able to operate in a multiple BSA configurations in a single channel environment.**

- Can the MAC handle overlapping BSA's using a single channel.
- What are the provisions for spatial re-use of the spectrum.
- What is the overhead involved to coordinate this.
- What is the impact of overlapping networks on throughput.
- What are the service limitations for this configuration.
- What is the "Re-associate" algorithm, and what is the impact on response time and throughput.
  
- What are the "Re-associate" provisions for Time Bounded Services.

**MAC should be able to operate in a multichannel environment.**

- What is the overhead involved to coordinate this.
- Is there a limit (max or min) on the number of channels.
- What is the "Re-associate" algorithm, and how seamless is it.
- How are the channel re-use limitations aspects handled in the MAC.
- What channel management functions are needed.

**Support of Ad-Hoc Networks**

- Can the MAC support infrastructure-less (ad-Hoc) networks.
- Can the Ad-Hoc networks overlap with infrastructure networks, and what is the mutual impact.
- Can a Station be connected to an Ad-Hoc and Infrastructure Network at the same time.
- What is the procedure to set up an Ad-Hoc network.
- Is there a Power saving mode supported in Ad-Hoc.
- What security services are available.
- Can multiple Ad-Hoc networks overlap (on the same channel)

**MAC must support low power operations.**

- What are the Power Management provisions supported by the MAC.
- Does the MAC support extreme low power stations that need battery life of months.
- What are the Power Management provisions for Ad-Hoc operation.
- What are the different service levels associated with different Power Management modes.
- What is the impact of the "Re-associate" scenario on the power consumption.
- What is the effect on the performance.
  - . Station throughput performance.
  - . Response time

**MAC need to support Multiple PHY's.**

- Support at least a 1-20 Mbps bitrate.
- Need to support the regulatory requirements in the different bands.
  - . DSSS in 915 MHz, 2.4 GHz and 5.8 GHz ISM bands
  - . FHopper in 2.4 GHz and 5.8 GHz ISM bands
  - . Narrow Band (1.9 GHz including Etiquette)
  - . IRed

- . Wide-Band (ETSI 5.2 GHz)
- What are the generic provisions to support the different PHY's.
- What is the method to include PHY dependent MAC functions.

### **MAC Access Function Requirements.**

- What is the default Coordination Function for Ad-Hoc and Infrastructure mode operation.
- What is the limit for the number of Stations that can be supported by the Coordination Function.
- How fair is the access method.
- What is the stability of the access method during high load.
- What is the throughput capacity of the access method.
- How robust is the access method for interference.
  - . ISM band interference.
  - . Co-channel interference.
- What are the medium sharing characteristics in case of a overlap between BSA's that use the same channel.
- What is the overhead associated with the access method.
- What is the method to support mixed Isochronous/Asynchronous traffic.
- What is the Bursty traffic performance of a Station
  - . MAC to MAC.
  - . End to End.
- What is the effect of Isochronous traffic on Bursty traffic performance.
- What is the Isochronous robustness.

### **Access Method Independent Features**

- What are the security provisions provided by the MAC.
  - . What is the impact on the existing infrastructure when security is required.
  - . What are the different levels of security supported.
- Does the MAC support mixed bitrate operation.
- How does the MAC support the defined DSS functions.
- What are the extra requirements for other 802 standards, imposed by this MAC and proposed architecture.
- What are the parameters affecting inter Access Point interoperability.
- What are the managed objects of a MAC

#### **Conclusion:**

The MAC requirements have been listed in major categories. Each of the categories provides a checklist that can be used to compare different MAC proposals against.

I propose to use this checklist as a basis for the comparison, and as a guideline to develop comparison criteria.