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.