

IEEE 802.11
Wireless Access Method and Physical Layer Specifications

Title: Comments on the Draft requirements document IEEE 802.11-92/40

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Abstract: This document contains my response to the draft requirements document we produced during the Irvine meeting. It contains the comments I have send to the Requirements document editing panel.

Conclusion:

- Define the basic configuration to be supported
- Coordination function need to be defined
- Mixed configuration requirement to be added
- Need gracefull degradation statement for mixed configurations.
- Drop the table and coordination function implementation details.

Comments on the Draft Requirements document.

Introduction:

We have had extensive discussions about the Draft 802.11 Functional Requirements document during the last meeting, and I promised you to put my thoughts on paper.

I think we had a very productive meeting on Tuesday night, where everybody had the right concept in mind, and we came up with pure requirements and their definitions.

This attitude changed somehow in the wednesday morning meeting, when we got mixed up with specific implementation assumptions. I think this happened when Bob Crowder presented his matrix which assumed two different type of "coordination functions". This caused a lot of controversy, also because they were related to centralized versus distributed coordination function concepts, which were also explained as the CSMA versus TDMA implementation examples.

Discussion:

I think we have to go back to the basic "Configuration" requirement we want to meet. We had discussed that during the Tuesday evening meeting, but this was not captured in the Draft 802.11 functional requirement document.

The basic Configuration requirements are:

- Small Ad-Hoc networks need to be supported. (Ad-Hoc means, that stations can setup a network without the need for an infrastructure).
- Business/Campus size Network coverage need to be supported.

The architecture to achieve this was discussed, resulting in the BSA and ESA concepts, and the associated 802.11 distribution function.

This resulted in the following configurations:

- An Ad-Hoc network would be a single BSA, not connected to a 802.11 conformant infrastructure (distribution function).
- A Business/Campus size Network would be supported by an ESA, which are multiple BSA's connected to each other via a 802.11 conformant distribution function.

In addition the following internetwork configurations exist:

- A single BSA network hooked up to an existing 802 wired network.
- An ESA network hooked up to an existing 802 wired network.

In addition a mix of the above should be possible. This would cover the overlap between:

- Multiple Ad-Hoc Networks.
- Multiple ESA's.
- Ad-Hoc networks and other BSA's and ESA's.

The latter covers what kind of characteristics are needed for a "Coordination Function", which allows this mixed environment to work with graceful degradation in throughput/performance per network. A statement regarding graceful degradation should be put in the requirements.

The above describes the basic configuration requirements, which I think we want the standard to support. There is no need to state additional requirements to define the "Coordination Function" which will be needed to accomplish/implement the configuration requirements.

What is needed however is a good definition of the term "Coordination Function". As I recall correctly it was described by you to be:

Everything that controls the function of putting information on the medium, and retrieving the information from that medium. I interpreted this as being local to one medium segment, so it does not have an end-to-end scope. In my understanding this would be the access procedure/protocol, the addressing method (source + destination) the segmentation information but also the CRC information in the frame structure (so the MAC frame structure).

However this introduces a new term being medium segment. A medium segment would be a set of stations that can directly communicate with each other without the need of an infrastructure. This sounds like a BSA, so we are back at square one. However not all stations that can "see" each other would be part of the same BSA. They can be separated by a segmentation address in the frame structure. So this is the link to the "coordination function".

This definition of 'Coordination Function' is currently not provided, and we should also question whether it is needed. Apparently it is needed to define a BSA like is already done, but an additional requirement is that all stations within the BSA can communicate directly with each other.

I think we should go back to the drawings we made during the meeting:

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-----
!           ! Ad-Hoc system which is one BSA.
!   BSA     ! Direct communication between
----- stations possible + Coordination function
    
```

```

-----
! Distribution Function   ! ESA System
    
```

```

---X---   ---X---
! BSA  !   ! BSA  !
-----
    
```

Apart from the above two, we also have the internetworking configurations where the systems are connected to an 802 wired network.

I think these are the basic requirements.

The table discusses different implementation methodologies of the coordination function, that can be used to achieve the basic configuration requirements, but it does a very poor job in explaining the underlying basic configuration requirements that the standard needs to support. In addition it does not explain the mixed configuration needs.

In any event I think that type B is a valid implementation alternative, so what is the purpose of the table. It is only raising additional confusion, while it does not make clear what the configuration requirements are.

In particular the sentence; "Types A, C, and D, must be supported."

is very controversial. The way I read this is that both type A and C "must" be implemented. This means that two alternative control function implementation methodologies need to be supported in the same device.

I suggest to delete the table altogether, and to replace it with the basic configuration requirements we want to achieve. In addition a statement is needed to describe the consequence of a mixed environment. A medium sharing consequence can be described in terms of graceful degradation of individual performance.

We need to watch out that the document should contain requirements only, not implementation details. The implementation details will be the standard itself.

Please provide me with some feedback about my definition of the "coordination Function".

Conclusion:

- Define the basic configuration to be supported
- Coordination function need to be defined
- Mixed configuration requirement to be added
- Need gracefull degradation statement for mixed configurations.
- Drop the table and coordination function implementation details.

Additional remarks:

During the discussions it became clear to me that there seems to be a strong perception, that distributed access protocols are not efficient, and are therefore less suited for a Wireless MAC protocol.

This is apparently the background reason why the requirement discussions were focussing on the type of coordination function implementation detail. This is apparently because the perception was there that for a large and more dense environment like an ESA, where multiple BSA's need to share the same medium, a distributed coordination function would be much less efficient.

However the oposite is true. In Doc IEEE 802.11-92/51 which contains simulation results that describes the most important characteristics. Performance analyses show good performance and excellent sharing behavior for all the distributed protocols considered.

Furthermore by analysing the MAC proposals made sofar it appears that a number of the "centralized control" proposals do not take into account that the wireless environment is interference limited rather than noise limited.

