

Streaming Support for 802.11b MAC

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Is Stream Different From (Async) Data?

Asynchronous Data

- Little or no latency restrictions
- Real-time delivery not an issue
- All data frames are treated equally

Streams

- Sensitive to latency in delivery
- Network throughput is an issue as it controls how many streams can be effectively transported at any given time
- Frames from different streams can NOT be treated equally

What is a Stream?

- Streams are virtual connections over the data frame based MAC/PHY services.
- A stream is also a set of frames from one application requiring specific services and a specific range of parameter values for the required services. Some of the examples of the services are;
 - Latency: How often the stream frames are transmitted independent of the network traffic conditions.
 - Bandwidth: How many stream frames are transmitted per second independent of the network traffic conditions.
 - Priority: How important is this stream compared to other traffic on the network
 - Channel protection: How much error correction or retransmission is carried out on the frames of the stream.

Why Streaming?

- Some sources of streams requiring Qos over 802.11B LANs are
 - Cable modem connections
 - DSL connections
 - WAN connections
- Multimedia data generated inside home
 - CD quality Audio
 - MPEG or other Video streams from camcorders/PCs
- If all these data are treated equally at 802.11B MAC, the effort of these layers to provide QoS will be undone at 802.11B MAC

Some Delivery Requirements

- MPEG needs 4-5Mbps bandwidth for reasonable quality video and can afford latency of about 3 video frames (approx. 100msec).
- VOIP needs 64Kbps (or less) but has the latency requirements in the order of 10msec.
- Interactive games could have varying bandwidth requirement depending on the information exchanged but strict latency requirements.
- Number of retransmissions of a video or voice data frame is limited due to the required large bandwidth and/or the latency involved. Hence need good channel protection.
- When there are data frames of different types at the same STA, their transmission needs to be prioritized to provide better service to more important data.

Why is Enhancement Required?

- Different transmission requirements of different data types demand support for streams
- Efficiency requires peer-peer communication during CFP
- Interfacing to broadband needs preservation of Quality of service (Qos)
 - Priority Classes, BW reservation , Bounded Latency
- Interference in the wireless channel demands better mechanisms to improve the channel throughput
- Multiple coordinators of different BSSs in a nearby locations need to share channel in an efficient, organized manner

What are the Required Enhancements?

- Simple support at the MAC level for streams and priority services
- Collision free channel sharing by multiple overlapping BSSs
- Reliable access mechanism for Beacon
- Error correction based on type of stream
- Demand based retransmissions based in type of stream
- Channel agility to move over to a better channel from a severe channel

Are These Enhancements Compatible?

YES. They are compatible. There is NO CHANGE to the existing DCF and PCF STAs

- Beacon, CFP and NAV currently exist in 802.11B
- Access mechanism for Beacon can be overlaid over DCF
- Error correction can be made available only for streaming
- More control frames or *elements* within them can be defined without affecting the compatibility with the existing STAs

Are the Enhancements Feasible?

YES, because,

- Simple stream enhancements to the 802.11 are possible
- There are simple but efficient scheduling mechanisms available
- Low complexity error correction schemes with little bandwidth overhead are available
- Simple, low complexity selective retransmission mechanism is possible
- Some form of channel agility is already present in 802.11.
- Other required co-ordinations can be achieved by simple control information exchange between the devices based on the demand