

IEEE 802.11

Wireless Access Method and Physical Layer Specifications

Wireless Local Area Network Requirements: Office Applications

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Abstract

The anticipated requirements of office applications on wireless LANs are summarized as developed by the office application working group.

1. Applications

1.1 Application Services

The following applications have been currently identified as present in the office. The anticipated network traffic of many applications can be generally represented by a subset of of these applications.

File access/sharing	Shared, block demand file access. Unit of access is a random access data block - about 1K bytes.
Program paging	Block demand backing store swap of program execution images. Unit of access is the page - about 1K bytes.
Program access/sharing	Shared program file access. Performance is often similar to either file transfer or file access (paged access).
File transfer	Bulk file copy - unit of access is the entire file as a stream of packets.
Printer/Facsimile sharing	Sharing of common network resource. Traffic model is often similar for file transfer with bulk file copy of a disk buffered file image to the network resource.
Electronic mail	File transfer of compound documents consisting of text, voice, image, graphics, video. Often two file transfers are required - one from the originating station's email agent to the post office, and the second from the post office to the destination station's agent.
Terminal emulation	These applications includes advanced terminal emulation services such as X-terminal as well as more mundane modem sharing.
Data entry	Low volume entry of forms information. The traffic model is assumed to be a low volume transaction processing application.
Environmental control	Distributed control of building facilities: HVAC, etc. It is speculated that this application's traffic can be generally represented by a low volume distributed computation application.
Database access	A specialized case of transaction processing in which requests for database access are made of database servers by database client stations. The transaction processing traffic model is anticipated to adequately model this application.
Transaction Processing	A class of applications in which client stations request services of server stations using a Remote Procedure Call paradigm (e.g. request/response).
"Collaborative" computing	A class of applications in which multiple stations simultaneously manipulate shared objects. These

	applications will likely be implemented as high resolution access to common shared storage objects. It is speculated that their traffic model will resemble high utilization file access.
Image manipulation	Shared manipulation of digitized images. It is speculated that this application can be modelled by the file access traffic model for very large files.
CAD/CAM	CAD/CAM contains a number of applications within its broad scope. Design can be modelled as image manipulation. Evaluation and modelling can be modelled as distributed computation using compute servers. And distribution of results can be modelled as file transfer.
Distributed computation	A class of generalized applications in which an application is distributed across a number of nodes communicating via a Remote Procedure Call protocol. It is speculated that the traffic model will resemble transaction processing.
Real-time voice (POTS)	Digitized packet voice. Anticipates requirements where a portable data station integrates a real-time voice service.
Real-time video (TV)	Digitized packet television. Anticipates requirements where a portable data station integrates a real-time video service.

1. 2 Explicit Standards Support

Office wireless LANs must support interworking with other, wired, industry standard local area networks including IEEE 802.3, 802.4, 802.5, 802.6 and FDDI. In addition, services common to all these networks such as 802.1, 802.2 and 802.10 must be supported.

1.3 Implicit Market Requirements

Successful office LANs, in addition to the de jure support of standards, must support de facto network standards. Of particular importance is the support of industry standard network operating systems including:

- Novell Netware
- TCP/IP/NFS
- AppleTalk
- LAN Manager; and
- SNA.

2. Platforms and Configurations

2.1 Anticipated Node Types

The applications identified above will be implemented on a range of user stations including the following.

Desktop PC
Workstations
Portables
Handhelds Ranging from notebooks -> palmtops
Bridges/gateways
Servers
Network peripherals with built-in network attachments
Telephones
TVs

2.2 Node Population

- $1 < X < 200$
- Average x about 12
- Caution: this is a historical number that future applications may change

2.3 Node Distribution

- < 1000 stations/hectare presuming about 1 station/person - about 100/ft²
- This can be a bursty number too presuming that users may occasionally cluster (e.g. meetings).

3. MAC Service Requirements

	File Access	File Transfer	Terminal Emulation	Transaction Processing	Real-Time Voice	Real-Time Video
MSDU Size	60% 80 octet 40% 600 octet	20% 80 octet 80% 600 octet	90% 80 octet 10% 600 octet	60% 80 octet 40% 600 octet	32 octet fixed	600 octet fix
Session Thruput	Media speed	Media Speed	< 64 Kb/s	Media speed	< 64 Kb/s	< 3 Mb/s
Duty Cycle	< .1%	< .1%	< .5%	< 5%	100%	100%
Delay	1 msec	< 10 msec	1 msec	1 msec	< 30 msec	< 30 Msec
Delay Variation	< 10 msec	< 10 msec	< 10 msec	< 10 msec	4 msec	4 msec
Privacy	Yes	Yes	Yes	Yes	Yes	Yes
Integrity	Yes	Yes	Yes	Yes	Yes	Yes
Fairness	Yes	Yes	Yes	Yes	Yes	Yes
Lost Packet %	< .1%	< .1%	< .1%	< .1%	< .1 %	< .1%
Outage %	< .1%	< .1%	< .1%	< .1%	< .1%	< .1%
Residual BER	< 10 ⁻¹²	< 10 ⁻¹²	< 10 ⁻¹²	< 10 ⁻¹²	< 10 ⁻³	< 10 ⁻⁶