

July 1990

Doc: IEEE p802.11/90-7

Doc: IEEE p802.4L/90-29

Documents for establishing IEEE P802.11

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Attached are the following, retyped, documents presented to the Executive Committee P802.0 on Thursday evening, July 12, 1990:

- the motion, including the intent of P802.4,
- the Scope and Objectives for the new group,
- the qualification Criteria for setting up a major project in IEEE P802,
- the reasons and arguments why the work could not be done within the charters of other Working Groups,
- the Project Authorization Request (PAR).

The Executive Committee did approve the establishment of the new group (IEEE P802.11), however , the Executive Committee put the PAR on the table till Thursday evening of the the November 1990 meeting.

Project 802 Resolution

Date:
Time:

Mover: Paul Eastman

Motion: That the IEEE 802 Executive Committee (802.0)

- 1) endorses modifying the existing 802.4L PAR for wireless LANs to permit the development of a MAC more appropriate to the problems (features) of wireless media. and
- 2) approves the formation of a new Working Group, 802.11, for the development of wireless LANs, to which the modified 802.4L PAR will be assigned.

Second: _____ .

For: _____ Against: _____ Abstain: _____ .

STATEMENT OF INTENT:

After the creation of a more appropriate home for 802.4L, and after completion and resolution of a TCCC ballot on 802.4J4 fiber optic conformance, it is the intent of 802.4 to move to inactive status.

STANDARDS DEVELOPMENT CRITERIA

4.1 Broad Market Potential

- a) Broad areas of applicability, and general consumer desire for wireless connectivity
 - accounting and financial services
 - health care and medical services
 - retail
 - education
 - on-site consulting and demonstrations
 - office and shop floor -- rapid interconnect
 - portable and hand-held computers -- on the run, in meetings, in parking lots, etc

- b) Multiple vendors
 - vendors of similar-technology products:
 - + CSMA/CA spread-spectrum based:
Telesystems, O'Neill, Agilis, Symbol Technologies, Nynex, Hillier Technologies, PA Consulting
 - + Other commercial (non-spread-spectrum):
IBM, Motorola, AT&T, Ericson, British Telecom, Seiko, Philips
 - + Military spread-spectrum by companies participating in 802.4L: Hughes, Motorola

 - Vendors interested in 802.4 Wireless LANs:
NCR, Hughes, Motorola, LACE

- c) Balanced costs (LAN vs attached stations)
 - Non-recurrent cost (initial installation)
 - + Fixed infra-structure cost
 - varies t most linearly with area covered
 - independent of number of users
 - + Connection-cost constant per node -- expected less than twice Ethernet at similar volumes

 - No recurrent cost for moving connected equipment (COST/MOVE = \$0)

STANDARDS DEVELOPMENT CRITERIA (Cont'd)

4.2 Compatibility

a) Functional requirements

- The proposed standard will meet all of the IEEE 802 Functional Requirements, except that the detected BER requirement of 10^{-8} will be met
 - 1) for all but 0.1% of locations, due to time-invariant fading, and
 - 2) for all but 0.1% of the time in other locations due to time-variant fading. Protocol will be designed to cope with this second type of fading.

NOTE: These outages are an inescapable consequence of using media subject to fading. Moving 7 cm (3") or less will move out of the time-variant fade.

b) IEEE 802.1 Architecture, Management and Interworking

- Agree to meet all requirements, including GDMO definitions of managed objects

c) IEEE 802.2 Logical Link Control

- Will support and specify 802.2, including support of 802.10 SDE (which will be commonly used with this medium)

d) IEEE 802.2 and ISO 10039 MAC Service Specifications

- Will meet both specifications.

STANDARDS DEVELOPMENT CRITERIA (Cont'd)

4.3 Distinct Identity

- a) Different from other IEEE 802 standards
 - Only wireless LAN (will subsume 802.4L)
 - Only LAN capable of serving mobile users, moving at slow speeds (<= 8 km/h, 5 miles/h)

NOTE: Goal is to be able to have terminal move at speeds up to 50 km/h (30 miles/h) to accommodate terminals on fork lifts, etc

- b) One unique solution per problem
 - only MAC designed to handle the fading and near/far problems of "through-the-air" media
- c) Easy for the document reader to select the relevant specification
 - See a) and b) above

4.4 Technical Feasibility

- a) Demonstrated system feasibility
 - the anticipated MAC is similar to that used in commercial VSAT networks, and to the AMDAX CableNet protocol for which 802.6 was originally formed
 - the anticipated PHY is similar to Qualcomm's digital cellular telephone system, and to the GEOSTAR truck communications system
- b) Proven technology, reasonable testing
 - see a) above. Spread-spectrum technology has been proven in military systems for many years, and recently by the CSMA/CD vendors listed under 4.1b) above
- c) Confidence in reliability
 - This technology is extremely reliable. For example, cellular telephones and law enforcement radios use similar technology

STANDARDS DEVELOPMENT CRITERIA (Cont'd)

4.5 Economic Feasibility

a) Known cost factors, reliable data

-- Station connection is no more complex than Qualcomm's cellular telephone, which has a volume price goal of \$200 - \$300.

b) Reasonable cost for performance

-- the above cost figures provide a reasonable price for true portability. This will be the REAL "ethernet".

c) Consideration of installation cost

-- Less than cost of wiring a LAN. See ECMA draft technical report on requirements for IVD LAN, specifically Appendix B - Costs Associated with IVD LAN Technologies.

NOTE: One technical approach under consideration could cover one floor of a building, up to 500 m in diameter, for \$5000 in fixed installation cost.

Scope and Objectives

1. Develop a wireless LAN technology suitable for portable and slow-speed mobile use within a local area,
 - to support packet-switched data, and
 - to support small amounts of packet-switched voice.
2. Interface directly to existing 802.x LANs via T or SRT bridges as appropriate, using 802.1D, etc.
3. Interface directly to existing 802.x stations via micro-bridges, which are terminals on the wireless LAN and which look like an 802.3 MAU, 802.4 modem, 802.5 trunk coupling unit, etc., as appropriate. These are store-and-forward devices which convert between wireless and other MACs using a shared address space. They do no learning, routing, or address filtering
4. Meet all of the other 802 functional requirements, as specified in the PAR

Minor Objectives

1. The MAC sublayer and Physical layer specifications shall permit implementation with existing multi-sourced components (e.g. IC, SAW filters) to the extent practical
2. Specification of an RF Physical layer shall anticipate allocation of shared RF bandwidth for LAN use by various controlling administrations (FCC, etc)
3. The MAC design shall anticipate restrictions on low-frequency pulsing of E-M fields (due to biological hazards). This will require the transmitter on-off rate to be either irregular or a few hundred Hz or greater, under all conditions

NOTE: Use of existing MACs will not meet this environmental constraint.

Reasons for not using an existing MAC standard

1. All existing 802 MACs require simultaneous transmission by one node and reception by all other nodes. The dynamic range of wireless systems makes such a mode of operation extremely difficult. Two-way alternate transmission between mobile terminals and a fixed distribution system is almost certainly required for a cost effective wireless LAN
2. Fading characteristics of wireless media require an appropriate MAC design
3. Biological hazards due to low-frequency pulsing of electromagnetic fields may require a MAC which specifically avoids transmitting at an approximately-constant repetition rate.
(NOTE: The worst rates appear to be $15 * n$ Hz,
 $1 \leq n \leq 6$)
4. The requirement for current 802.3 and 802.4 MACs that all nodes on an unbridged LAN overhear all MPDUs, makes any wireless LAN based on these protocols use almost twice as much bandwidth as a wireless LAN based on a more appropriate MAC, for the same interconnectivity.

Additional reasons for a separate MAC

1. The RF channel itself has regulatory constraints which restrict a good efficient fit for any of the current 802.x protocols
2. The use of other 802.x protocols cannot efficiently utilize the precious RF spectrum resources, due to the specific RF channel environment
3. The need to provide wireless connectivity in the market is not satisfied
4. The through-the-air connectivity has unique propagation characteristics that is distinctively different from that provided by a physical connection such as fibres and wires
5. The channel provided by wireless connectivity can be made compatible fully or partially with other 802.x environment

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IEEE

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IEEE Standards
PROJECT AUTHORIZATION REQUEST (PAR)

1. Date of Request: 1990-07-12

2. Assigned Project #:

3. Does this PAR revise a previously approved PAR? YES NO

4. Description of Proposed Document: Standard Recommended Practice Guide New Revision of Std. _____ Trial Use Full Use

5. Project Title: Wireless Medium Access Control and Physical Layer Specification

6. Scope of Proposed Standard: (Use attachment sheet if necessary.) To define a medium access control and Physical Layer Specification wireless LAN suitable for fixed, portable and slow-speed mobile use within a local area.

See also attachment 1

7. Purpose of Proposed Standard: (Use attachment sheet if necessary.) To provide wireless connectivity to automatic machinery and stations which need rapid deployment, which are portable or hand-held or which are mounted on moving vehicles within a local area. To prepare, if necessary, a petition or response to inquiry to the FCC for rulemaking which authorizes use of radio spectrum for wireless LAN. See also attachment 2

8. SPONSOR: Society: Computer Society
Committee: TCCC

9. Name of group that will write the standard: IEEE P802.11

10. Target Completion Date: 1990-12-31 ~~1990x12x31x~~

11. Proposed Coordination: (See instructions.) SCC10 (IEEE Dictionary) CCIR (IWP 8/13 and 8/15) Method of Coordination: Draft circulation

12. Are you aware of any patent, copyright, or trademark issues? (If yes, attach a sheet with an explanation.) YES NO

Are you aware of any standards or projects with a similar scope? (If yes, attach a sheet with a complete description of the impact of the similarities.) YES NO

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PROJECT AUTHORIZATION REQUEST (PAR)
(cont'd)

13. Copyright Agreement for IEEE Standards

I hereby acknowledge my appointment as Official Reporter to the _____ Committee to write/revise a Standards Publication (entitled or to be entitled) _____ See project title

In consideration of my appointment and the publication of the Standards Publication identifying me, at my option, as an Official Reporter, I agree to avoid knowingly incorporating in the Standards Publication any copyrighted or proprietary material of another without such other's consent and acknowledge that the Standards Publication shall constitute a "work made for hire" as defined by the Copyright Act, and, that as to any work not so defined, I agree to and do hereby transfer any right or interest I may have in the copyright to said Standards Publication to IEEE.

Name _____
(chair of working group)
Title _____
Date _____

14. Person delegated to receive communications and conduct liaison with interested bodies:
(This is normally the chair of the working group. If not, please indicate IEEE position.)

Name Vic Hayes Telephone 011 31 3402 76528
Company NCR Systems Engineering B.V Fax 011 31 3402 39125
Address Zadelstede 1-10 Telex 47390
City Nieuwegein State NL Zip 3431 JZ E Mail Vic.Hayes@
Utrecht.NCR.COM
Utrecht.NCR.COM

15. Submitted By:
(This is normally the sponsor's liaison to the Standards Board. If not, please indicate IEEE position and relationship to the sponsor.)

Name _____ Telephone _____
Company _____ Fax _____
Address _____ Telex _____
City _____ State _____ Zip _____ E Mail _____

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Guide

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Name _____
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