

CHARTER AND OBJECTIVES
IEEE 802.4L – THROUGH-THE AIR TOKEN BUS PHYSICAL LAYER
STATUS: Accepted by 802.4L on March 26 for submission to 802.4.

CHARTER

To provide an alternative physical medium for through-the-air communication for mobile equipments as part of a local area network using the 802.4 access technique. The system should use the special advantages of token bus: *There is no possibility of two stations transmitting simultaneously, and there is no requirement for fixed equipment to resolve contention.*

OBJECTIVES

1. An acceptable solution could use either radio up to 3500 MHz or light from 300 to 1500 nanometers.
2. The covered area assumed is one square mile (3 square kilometers) for which economic factors are optimized. More than one fixed antenna/transducer may be used to cover this area. This coverage should be provided under all of the following conditions:
 - A. At 95% of all locations (on a 1 meter grid) with a vehicle antenna/transducer height above floor level of 2 meters and a fixed antenna/transducer height above floor level of 4 meters.
 - B. In all of these environments: 1) Factory floor with large metallic obstructions and high radio noise; 2) Offices with large open areas and 1.5 to 2 meter high area dividers and partitions; 3) inside and outdoor storage areas with tall shelving containing metal and non-metal parts/inventory stocks; and 4) other.
 - C. The system should operate with some non-cartesian (non-perpendicular) aisles and passageways.
3. The payload data rate must be greater than 250 kilobits/second, and a rate of 1 Mbs or greater is very desirable.
4. The preferred interconnection point for this physical layer is at the 802.4G DTE/DCE interface. The radio/optical system is to look like an alternative type of modem.
5. Error correction techniques within the physical layer may be used to improve the apparent error rate to a level within an order of magnitude of the other 802.4 physical mediums.
6. The use of multiple antennas/transducers at fixed points should be assumed. This implies reuse of the same optical or radio frequency within the system for which provisions should be made.
7. For a RADIO SYSTEM, the following initial assumptions should be made:
 - A. The operating frequency of the system is up to 3500 MHz. The current assumption is 1700-1710 MHz.
 - B. No more transmitter power shall be used than is necessary.
 - C. Fixed antennas are 4 meters above floor level. Mobile antennas are 2 meters above floor level, and their performance must not be significantly degraded by floor tilt.
 - D. Fixed antenna directivity should be designed to reduce long distance propagation and reduce susceptibility to multipath effects.
 - E. Applicable FCC Rules in Part 15 and Part 18 must be recognized.
8. For an OPTICAL SYSTEM, the following initial assumptions should be made:
 - A. The power of emitters must be below the level set by OSHA to avoid risk of eye damage from looking directly at it.
 - B. No dependence may be placed on white walls or ceilings for coverage of shadowed areas.
 - C. Fixed transducers may be proposed with sufficiently close spacing to have unobstructed paths to mobile units at more than 95% of all locations.
 - D. Fixed and mobile transducers may employ collimation in the vertical plane. The mobile optical system must accept tilt in the floor plane.
 - E. There is no requirement for the optical system to work in adverse weather, however the equipment shall not sustain permanent damage from exposure to rain, fog or industrial air pollution.
9. (unused)

DETAIL OBJECTIVES FOR RADIO

10. The coverage plan should be based on a square cell with quadruple redundancy. Default length for one side is 300 feet/100 meters, maximum.
11. Data throughput shall be 1 megabit/second in both directions.
12. The limitation balance is set by the dimension of the square which sets minimum C/N for given power and environment and which determines the maximum baud rate usable; directivity of the mobile receive antenna which determines (in part) C/I; receive diversity and error correcting codes which determine net BER. The tradeoff shall be made with the following priority order for achievements: 1) 1 megabit data rate, 2) required BER, 3) required minimum C/I.
13. A transmitter power output of more than 50 milliwatts shall not be used.
14. Cochannel interference may be resolved at the mobile receiver using antenna directivity, diversity and with choice of error correcting codes.
15. The fixed network shall be a head-end, regenerating type with a retransmitting delay not to exceed the length of the message plus 100 bits plus propagation time.
16. Diversity may be used so that messages transmitted may be received in duplicate at the mobile.
17. Each receiver at a fixed point may have a dedicated path to a central head-end. The head-end will select a correct message for rebroadcast with some delay.

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15. *Uncertain if record is correct.*
17. *was: the best; changed to: a correct.*