

V.2.LNI TRANSMISSION SUBSYSTEM REQUIREMENTS

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The requirements for the local net transmission subsystem are wide-ranging, and have not previously been collected in one place. This note collects a target set of requirements so that as different designs are tried some of the more esoteric requirements are not accidentally overlooked.

A. General

Data rate: 8 Mb/sec desirable (Note--if a significant complication is required to attain this rate, it is acceptable to relax this requirement. The minimum acceptable data rate is 4 Mb/sec.)

Protection: 1) The LNI and its attached node must not be damaged by any combination of short circuits among signal lines, signals, protective or building grounds, or 110/220 v.a.c. lines.
2) No damage from lightning strikes that are successfully handled by the building protective system.

Grounding: Attached nodes must be isolated from one another at D.C. Maximum D.C. or low frequency current flowing from one node to another less than 10 ma. if one of the node grounds is accidentally held at a 1 kv. potential.

Safety: 1) Transmission subsystem must be ground referenced, not floating.
2) Maximum voltage appearing between any pair of transmission lines or any transmission line and building ground during normal operation: 25v. peak-to-peak.
3) Maximum current supplied by any transmission line: 100 ma.

4) All components of the transmission system must be capable of meeting installation requirements of the 1978 National Electric Code, Article 800, for Communication Circuits. (The primary impact of this requirement is that transmission cable must meet building code flammability and low-smoke-production requirements for running through false ceilings used as air-return plenums.)

Error rate: (N.B. packets may be of 100 to 1000 bits in length)
Desirable: less than one packet in 10^3 contains an error. Acceptable: less than one packet in 10^2 contains an error.

Environment: All nodes typically within a single building, or connectable via controlled environment ducts between nearby buildings. Building use is office/business or light manufacturing. Multiple electrical panels may supply power to different nodes. No components other than cable may be installed in concealed areas.

Physical compatibility: Transmission medium must be installable in existing buildings with no special prior installation provisions.

Physical interface: Transmission subsystem must not be disrupted by maintenance operations applied to attached nodes. The transmission medium must not physically enter the attached nodes.

Electromagnetic Compatibility: Must not disrupt attached nodes or other office equipment. Must not be disrupted by office equipment.

Fault location: It must be easy to locate the site of transmission medium failures.

B. Specific to ring configurations

Line length: Physical length may vary from a minimum of 3m to a maximum of 200m. Electrical length will be held constant by resistive and capacitive loading. Length may change at any time due to bypasses; manual realignment or readjustment of transmitter and receiver is not permitted.

Bypass:

- 1) Medium must be capable of automatically bypassing any repeater if the repeater is not reporting that it is functioning correctly. It must also be possible to manually enforce bypass regardless of the repeater state.
- 2) Transmission subsystem must operate reliably with any combination of up to 200 meters of transmission line length, two loading networks, and up to 100 bypasses between the transmitter and receiver. (It will be the normal case that at any time a large fraction of the nodes will be inactive and powered down.)

Repeater design: Must minimize probability of failure of repeater and insure that all failures that prevent correct repeater operation are detected and invoke bypass. Desirable to minimize dependence on analog components at cost of extra digital components.

Repetition delay: Maximum repetition delay imposed by transmission medium and coding method: two bit times or less are a requirement to support the contention ring experiment. Otherwise, 8 bit times acceptable.

C. Desirable if Feasible (could be extra cost options, also)

Electromagnetic Compatibility: Capable of TEMPEST approval.
Capable of EMP survival.

Maintenance: Installable/Removable without special training or equipment.