Minutes of the IEEE 802.4L Working Group

New Orleans, Louisiana
March 13-17, 1989

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Secretary & Editor. Michael Masleid, Chuck Thurwachter.

Attendance.

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Meeting plan. The next 802.4L working group meeting is scheduled at the Clubhouse Inn in Atlanta Georgia, May 22-24. There will be a test and measurement session at GM in Oshawa Ontario tentatively scheduled for May 15-19 with an alternative for May 29-June 2 (the decision to be made on April 21 1989) and meetings at the next IEEE 802 plenary, starting Sunday, July 9-14, 1989.

Note by chairman:

The test and measurement session has been rescheduled. Currently the plan is for June 12-16. The arrangements to be discussed at the Atlanta meeting.

Plans for the measurement session. It is desirable to measure the radio- frequency channel characteristics in a factory automation environment. This measurements should includes path attenuation and delay spread when using distributed or multiple transmitters. The measurements should include the near and in band noise statistics. The in band noise might not be white gaussian in this environment. It is desirable to do these tests as soon as possible, the results are needed for proper development of the standard. The test method and equipment for multiple transmitter delay spread measurement must be invented and built. Then the necessary licenses must be obtained. It seems impossible to do these tests before the May 22 meeting.

The test will use two transmitters, one above (950 MHz) and one below the band (875 MHz), running at 100 mW. The license request should be for 500 mW. Someone at GM in Oshawa should be able to assist with this. Mr. Kleyne indicates that the geographic coordinates are needed, and that six weeks may be required to process and obtain the license.

NCR will bring most of the equipment. GM can assist with customs. GM should obtain the spectrum analyzer. NCR will supply the IEEE 488 controller. NCR's control programs are designed to run on IBM Pcs.

Noise tests should be done using calibrated antennas. For these bands a linear polarized log periodic (below 1 GHz) and a horn antenna (above 1 GHz) is appropriate. It may be necessary to use a second analyzer to avoid interfering with NCR's delay spread measurements. Test should record average, instantaneous, peak hold, and perhaps quasi peak noise. The intent is to discover enough about the nature of the noise to predict how it will interfere with signal detection.

NCR will be doing most of the radio-frequency tests. GM Oshawa is providing the resources. (Failures in the existing system for controlling AGV's costs GM 2M$ per year, they need a new solution). As in previous tests of carrier band and fiber optics, GM offers an open invitation to participate to all interested parties. If you come, bring appropriate shoes.

If at all possible bring experimental modems to test.

Attenuation in the factory. (Contribution by Mr. Tuch) Attenuation in a large factory is much better than expected with respect to the office environment. This attenuation is for single transmitters. These values will be used for comparison with the measurement to be made in Oshawa.

Start and end delimiters. (Contribution by Mr. Kleyne) One way of forming the start delimiters and end delimiter is to add two additional points to the transmission constellation. The original points are at 45, 135, 225, and 315 degrees. The new points are at 0 and 180 degrees. The data channel and delimiters channels can be decoded separately so that the error rate of the data channel is not degraded. The delimiters are extended to 3 octets to allow reliable detection. A fourth octet is added to support the I and E bits. Performance of this method is evaluated.

Discussion. Tom Phinney proposes that we might drop the I and E bits. Historically they exist to support a connection to 802.5 that did not come to pass. Beyond that, the bits exist to assist the PHY-layer and repeater functions. The working group is at liberty to define the internal operation of the PHY-layer as needed.

For now we will attempt to support the I and E bits, since one possible use of radio frequency waves is between building repeater functions. If it is impossible to do, it can be abandoned later.

CRC, run length forward error code, scrambling. Hamming distance of 4 applies to the CRC. This is independent of the run length forward error correction code, which is used to bring the channel error rate from 10^{-3} to 10^{-9}. Scrambling may be used for spectral density reasons. Clock recovery should be done from correlation with the spreading code, not from transitions in the scrambler, since no provisions exist to change the scrambler seed on retransmission.

Immediate response only. The network may be simpler to build if it is limited to immediate response message only, since back to back transmissions would never occur.

Is it reasonable as a standard activity to ballot a media that requires a constrained use of the base standard? There is always a problem with standardization of with knowing how to do something, and finding a way to do it that conforms with the standard. If you only had one start delimiters at the start of a transmission, and only one at the end of the transmission, start and end of transmission would be much easier to detect, you could go with data coding, you could use the normal symbol space because you have known preamble space, you could search back in time from the end to find the post amble. Not knowing where the ends are is solvable if there is only one transmission. There is still the problem of aborting due to an underrun. The protocol says put an abort, start and end to end the transmission.

Single frequency head end. The single frequency head end may have to buffer up to 1/2 second of data. This is not impossible, but the slot time must then be longer than 1/2 second. That exceeds what is allowed. Artificial segmentation could be used, as in the Cambridge ring. For now, single frequency head ends will be abandoned.

Media violation. There is a second media violation in radio frequency transmission. One of the requirements of the token bus media is that if one station can here a signal, and demodulate it, and it has a recognizable frame, then you can make the assumption that everyone heard something. It may be that one station in your net can clearly hear a station three blocks away, and can clearly demodulate it. A globally administered item is needed so that you know that the transmission can be ignored. There is a preamble code I.D. in here that can do that.

Range. With error correction, the range for a BER of E -9 is expected to be 1000 feet maximum between antennas in an excellent environment. Without error correction it is expected to be 300 feet in a typical office environment.

Use of HDLC for delimiters. You can not use a non linear code in 802.4. For n bits there must be m baud transmitted. All stuffing codes are non linear codes. All such codes have a Hamming distance of two.