Local Networking by Ring, Ethernet, Broadband, and PABX--Perspectives from the Field

Jerome H. Saltzer
M.I.T. Laboratory for Computer Science
Panel Coordinator

The advocates of various approaches to local networking have largely emerged from the ranks of research and development organizations, and have thus mostly described the prospective advantages of their preferred technologies. Often, in the field, the dominating concerns turn out to be different from the ones anticipated by the developers. This panel session will bring together four representatives of organizations that have each chosen different local network technologies, developed them, placed products in the field, and gained some practical experience. The panel members are:

David D. Clark
M.I.T. Laboratory for Computer Science
Cambridge, Massachusetts

Robert S. Printis
Xerox Office Products Division
Palo Alto, California

Kenneth J. Biba
Sytek Incorporated
Sunnyvale, California

Jim Carreker
Datapoint Office Communications Systems Division
San Antonio, Texas

A brief description of the position held by each panel member follows.

David D. Clark: Rings

While passive bus nets such as the Ethernet have received much recent publicity, many of the local network products actually in the field are based on a ring architecture. The particular ring to be discussed as an example, jointly developed by the Massachusetts Institute of Technology and Proteon Associates, Inc., is very similar to the proposed standard Ethernet in speed, size, number of hosts and other functional characteristics.

While rings offer a number of advantages relative to other architectures, they also have a potential drawback in the active repeater required at each station, because a single repeater failure disrupts all communications. However, good design and engineering can not only control this problem, but can convert it to an asset. This talk will discuss the intrinsic pros and cons of rings, and describe our experience with one particular design approach that has been reduced to a commercially available product.

Robert S. Printis: Ethernet

The Ethernet, like other local area networks, falls in a middle ground between long distance, low speed networks which carry data for hundreds or thousands of kilometers, and specialized, very high speed interconnections which are generally limited to tens of meters. The Ethernet is intended primarily for use in such areas as office automation, distributed data processing, terminal access, and other situations requiring economical connection to a local communication medium carrying bursty traffic at high peak data rates. In September, 1980, Xerox Corporation, Digital Equipment Corporation and Intel Corporation jointly published a specification for the 10 Mbps Ethernet. Its primary characteristics are:

Data rate: 10 Million bits/sec
Maximum station separation: 2.5 Kilometers
Maximum number of stations: 1024
Medium: Shielded coaxial cable, base-band signalling
Topology: Branching non-rooted tree
Link control procedure: Fully distributed peer protocol, with statistical contention resolution (CSMA/CD)
Message protocol: Variable size frames, "best-effort" delivery

The Ethernet defines what is generally referred to as a link-level facility. Higher level protocols which generally include such functions as internetwork communication, error recovery, flow control, security measures (e.g. encryption), etc., are required to increase the power of the communication facility and/or tailor it to specific applications.

One of the main objectives of the three companies in making the specification widely available is compatibility. It is intended that every implementation of the Ethernet be able to exchange data with every other implementation. Higher level protocols raise their own issues of compatibility over and above those addressed by the Ethernet and other link-level facilities. This does not eliminate the importance of link-level compatibility, however.

Kenneth T. Biba: Broadband

Broadband RF transmission offers unique and substantial functional, performance and operational advantages as the basis for an integrated local data communications network. Utilizing industry standard bidirectional cable television (CATV) data distribution facilities in combination with a packet switching protocol architecture and distributed network intelligence, a broadband network can provide high bandwidth, reliable digital communications for the low-cost interconnection of a wide range of user equipments over a wide geographic area. This talk examines some of the unique properties of broadband coaxial cable and describes a commercial local network, LocalNet, that exploits these features.

Jim Carreker: Digital PABX

Datapoint Corporation has experience with both coaxial cable-based local networks and with voice telephone systems. With an installed base of over 1,500 attached resource computing (ARC) local networks and over 1,000 INFOSWITCH telephone systems, Datapoint has developed an appreciation of the real-world problems of selling, installing, maintaining, and justifying both types of office communication systems. The recent announcement of the Digital PABX (the Datapoint ISX -- Information Switching Exchange) brings the potential of providing full data processing, word processing, electronic message systems and individual computing capabilities to every workers' desk at a very low cost per workstation. This talk will describe field experiences Datapoint has encountered in putting together an integrated communication system.