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Inside AppleTalk: Network Questions & Answers (11/95)

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TOPIC --

This article contains a series of questions based on material in "Inside
AppleTalk" with answers. References to "Inside AppleTalk" are from the March
1989 edition (ISBN 0-201-19257-8), published by Addison-Wesley.

DISCUSSION --

What's a Protocol Stack

Question: "Inside AppleTalk" suggests that a protocol stack is an implementation
of a protocol suite, like AppleTalk for VMS or AppleShare PC. Most other
literature refers to a protocol stack as a subset of the OSI model. An example
is TCP, which does not include layers 6 and 7 or selected protocols with
AppleTalk. Which is more accurate?   The implementation idea or the subset
idea?

Answer: Protocol stacks often implement only a portion of the OSI 7-layer model.
A protocol stack is a suite of protocols that implements the feature set for a
particular networking scheme. The term "protocol stack" typically refers to the
actual implementation of a networking scheme. TCP/IP's protocol stack only
implements the layers that it needs, whereas AppleTalk implements all of the
layers.

The OSI Model and Protocols

Question: Often, I have heard (and saw documented in "Inside AppleTalk") that
the OSI model is a general description of protocol usage and not the protocols
themselves. Yet page I-22 of "Inside AppleTalk" cautions that AppleTalk is not
necessarily compatible with the forthcoming OSI protocols.

What are these forthcoming protocols? What is OSI, if not a reference to
follow for integration into heterogeneous networks? What protocols for OSI
have already been established?   Are these based on CCITT protocols like X.25
and X.400?   (It seems to me that although we have protocols that match every
layer of OSI, we are only loosely tied to those layers. Is this so?)

Answer: The OSI 7-layer model has become a standard in the industry for
describing network architectures. This model was originally designed as a

blueprint for the OSI network protocols that were and still are in the process
of being implemented. Many of the lower layers have already been implemented,
and there are even products available for the Macintosh that provide
connectivity solutions to these protocols. The press has often described the OSI
architecture as the replacement for TCP/IP.

Although we have a network architecture that fits nicely within the OSI model,
AppleTalk cannot be considered an implementation of OSI any more than it can be
considered an implementation of TCP/IP.   We use the model, because it provides
a concise and elegant way to describe our network. We do not use the OSI
architecture, because many of its layers remain undefined.

AFP an Application?

Question: "Inside AppleTalk" shows AFP to be mostly Presentation and part
Application.
What aspects of AFP are Application? Wouldn't AppleShare File Server and
AppleShare Workstation be applications?

Answer: We are not sure why AFP is listed as falling partially into the
application layer.   We assume that it has to do with the fact that the
description of AFP in later chapters includes actual network services. AFP does
define many of the features that need to be implemented in AFP servers. If this
is the reason AFP falls partially in this layer, then AppleShare implements the
highest part of the application layer, putting the interface on the services
that have, at least, been partially defined by AFP.

CMSA/CA

Question: I understand that CSMA has at least two flavors: 1-persistent and
non-persistent. 1-persistent is when a deferring sender grabs the channel as
soon as it's released, contending with another sender who grabs the channel at
the same time. Non-persistent throws in a random period of time to back off
before attempting to grab the channel. Is this what we call CSMA/CA? Or, is
CA something different?   Or, is it non-persistent including handshaking? (See
page 1-3, "Inside AppleTalk.")

Answer: The CA in CSMA/CA stands for "Collision Avoidance".   It does implement
the random period of time you mentioned as opposed to collision detection (CD).

Ethernet throughoutput

Question: They say that the 10MBps of Ethernet is only used under heavy loads
and that its throughput does not come through at that rate.   What does this
mean? Are
nodes communicating at 10MBps or not? Is Ethernet a broadband network?   How
are the channels within the broadband used? (You can refer me to some other
documentation on that last one.)

Answer: "Throughput" is a term used to describe the actual rate of transfer
achievable over a network. This is a relative term, similar in reliability to
"MIPS" or "megaflops."   Network throughput is often measured by copying large

files across a network and calculating the amount of data transferred in a
specified period. As you can see, this throughput depends on the overhead of
the protocols being used and the capability of the servers to transmit data to
the client. The 10MBps specified for Ethernet refers to the ideal maximum
possible over coaxial cable and is never achieved in real-world situations.

Standard Ethernet coax is baseband cable, not broadband. However, these days,
you can run Ethernet over many different media, including broadband cable,
unshielded twisted-pair telephone wiring, T1 telephone circuits, satellite
links, and leased lines.   These have different speeds and characteristics.

Bridge

Question: A bridge is a datalink layer device only. It separates networks but
does not
use network numbers. Right?

Answer: A bridge is used to connect two physical networks of the same type into
one logical network. As far as any node on the network is concerned, this is a
single network.

Router

Question: A router is a higher-level device (either transport or network layer)
that
routes like-protocols from one network to another. The networks on either side
are identified by their network numbers. Like-protocol routing includes
AppleTalk-to-AppleTalk, TCP/IP-to-TCP/IP, SNA-to-SNA, and so on. Right?

A: A router is used to divide two physical networks into separate logical
networks using the same protocols. Each logical network has its own unique
network identifier(s) distinguishing that network from other networks on the
same Internet.

Networks and Bridges

Question: AppleTalk is a network protocol suite. A network is a specified
physical cable and datalink, like Ethernet and Token Ring. A physical network
is a cable. Are these accurate? Does a bridge create an Internet? Are the
segments on either side of the bridge networks or just physical networks? Are
physical networks and segments synonymous?

Answer: The physical network, or layer, typically refers to the physical medium
in use. This can be cable, twisted-pair wiring, and so on. If you go with the
definition above, a bridge does not create an Internet. A router provides the
necessary functionality and acts at a high-enough level to create an Internet.
A "segment," as you are using it, is a piece of cable or set of wiring that is
part of a physical network. This usually means as the physical medium on one
side of a bridge or router, but it could be a smaller part.

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