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## 004.

**REVIEW: ACCTON'S  
CHEETAHUB POWER 3012B**

BY BOB ROSS

The CheetaHub Power-3012B is an Ethernet hub with 12 Dual-speed RJ-45 ports and one Media Independent Interface (MII) port. Each of the RJ-45 ports support both 10Mbit/s

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## 003.

**SOFTSKILLS: COMMUNICATION**

BY DARRYL ALDER

- > Listening
- > Giving Information
- > Retrieving Information
- > Interpreting Information

This article looks at four basic communication elements: listening, giving, retrieving, and interpreting information. "Effective communication is the cornerstone of business and a uni-

> page 6, bottom

## 001.

**GET CLARITY: FRAME TYPES  
AND NETWORK PERFORMANCE**

BY BOB ROSS, LAN UTILITIES, LLC

- > Multiple Frame Types
- > A Bit of Frame Type History
- > 802.3 frame type risks in a multiprotocol environment
- > More 802.3 Risks
- > Frame Type Auto Detection
- > Switches/Proactive Testing

This article discusses (1) how frame type translation can seriously degrade your network performance, (2) why the Ethernet 802.3 frame type can be a serious concern on multiprotocol networks, (3) resolving switching concerns using proactive testing.

Since frame types vary depending on the media type, this article considers only frame types on an Ethernet network running the IPX protocol; however, the principles are applicable to any protocol (IPX, TCP/IP, etc.) running over any media type (Ethernet, Token Ring, Arcnet, etc.) with each of their particular frame types available.

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## 002.

**INSTITUTE TECHNICAL  
RESOURCE CD—GET IT, USE IT**

BY ED KRACH, CNP

- > FAQs
- > Access Codes for Licensed Software

**Q:** When I fire up the CD with Netscape or Internet Explorer, all I get is a black screen with a little red "X" in the upper left hand corner of the screen. What's up?

**A:** The problem stems from using a 16 bit real mode CD-ROM Driver. You need to update the CD-ROM Driver. Email TechCD@inpnet.org with your CD-ROM drive make and model, and we will point you to the update.

**Q:** My CD autostarts fine, but I cannot get past the main screen. I click and click but nothing happens. I'm using Microsoft's Internet Explorer 3.02.

**A:** The CD does not work with certain configurations of IE

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### The Problem with Multiple Frame Types

The number of frame types in use can dramatically impact network connectivity and performance.

Frame types can be thought of as the languages that networking software uses when it talks on the physical network wiring. If you are using Ethernet, your networking software can use up to four different frame types to communicate:

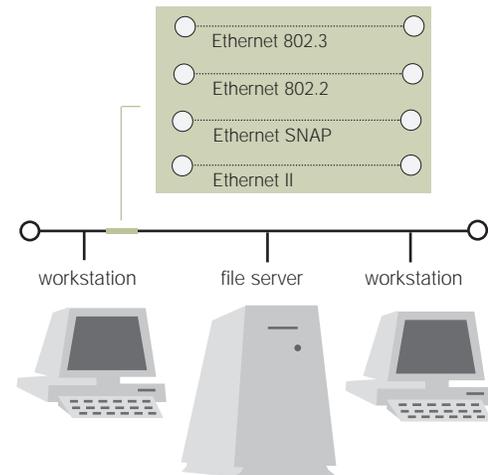
- Ethernet 802.3
- Ethernet 802.2
- Ethernet 802.2 SNAP
- Ethernet II (EII)

Frame types are analogous to human languages in that a workstation speaking Ethernet 802.2 and a server speaking Ethernet 802.3 will not understand each other; it will just ignore the communication.

The IPX protocol stack in a NetWare workstation can use only one frame type. It is configured by a line in the NET.CFG file. (While you can load more than one frame type on an ODI driver, IPX will only bind to and use the first frame type listed.) Other protocols can be listed in

the NET.CFG and loaded on the ODI driver, but they are there only for use by other protocols (one at a time).

On the other hand, a NetWare server can use one or more frame types for IPX. Each frame type creates a virtual network using a unique network address, sharing the same physical wire with other frame types. The NetWare router in the server treats each frame type as if it were on a different



1. Virtual networks on a single physical network.  
Physical network: — Virtual network: .....

version 3.02. We tested the CD with the latest Netscape and Internet Explorer, and while the CD worked fine on our configuration of IE 3.02, we've found that some configurations won't work. Here are a few solutions:

- Upgrade to IE 4.01 which is in the browser directory on the CD. This version will NOT install active desktop. You have three installation choices: browser only; browser with Outlook Express; and Browser with Outlook Express, FrontPage Express, and all the bells and whistles.
- Install Netscape 4.04, which is also on the CD in the browser directory.

- Manually type in a sub-link and the CD will work fine from there. You'll be able to browse the entire CD, and all the rest of the links work fine with IE 3.02.

**Q:** I followed the directions on the CD and followed the links to get my access codes for the software, but the web site won't let me log in.

**A:** The web site is updated daily with a list of current paid members. To access it, you must give us a unique, nine-digit ID number—such as your Drake or Sylvan-Prometric ID number—which becomes your password. Your Drake ID is a 9 digit number (in most cases, your SSN). You can find it on your test results, or just provide us

with a 9 digit number that you will remember as your password.

When we update your record, you may log in with your last name in lower case and your password.

### How to Get Access codes for Licensed software

1. When you load the CD, it will autostart to the main page on most Win95 & NT machines.  
(If this does not happen, double click on WELCOME.HTM, and the main page will load. If your CD ROM-drive is a network drive, make sure long file names are enabled.)
2. From the main page, click on SOFTWARE; then from the software

LAN segment (wire), even though it is really the same physical wire. The router acts as if there were four LAN cards and four different wires going to four different segments on the network.

Therefore, when a packet is received on one virtual LAN, the NetWare IPX router translates the packet and resends it with the new frame types on the other three virtual LANs on the same physical wire. This is called frame type translation. Frame type translation occurs for directed traffic (a packet addressed to a single station directly) that needs to be translated into another frame type for it to reach its intended destination, and for all broadcast (RIP, SAP, etc.) traffic and multicast (broadcast to a subset of stations) traffic. A network analyzer shows translated frames as valid traffic. Yet they can be totally useless, performing no function on the network and causing a potentially significant degradation in network performance. They waste valuable network bandwidth.

Think of this as if you were in a room at the United Nations. Of four ambassadors in the room, one only speaks English, one only speaks German, one only speaks Spanish, and one only speaks French. If any ambassadors speak without

a translator in the room, no one will understand them, and the communication is lost. With a translator in the room, an ambassador speaks, and the translator repeats the message in each of the other three languages. So communication takes four times as long as it would if everyone spoke the same language.

This is what happens on the network. An IPX packet can arrive at a NetWare server and need to be retransmitted back on the same wire three more times if IPX is loaded with all four Ethernet frame types on the server. This consumes up to four times as much LAN bandwidth as having only one frame type loaded at the server.

The problem of multiple virtual networks contending for physical media bandwidth gets even worse if there is more than one server on the network. Just two servers, each with IPX loaded using all four Ethernet frame types, echo a single packet as many as twelve extra times. So the network runs 1/13 as fast as with only one frame type in use.

With three servers, each having all four Ethernet frame types loaded, network traffic can be 48 times as great as with a single frame type. With more than three servers, the

keep one frame type per protocol on your network. Each protocol can use a different frame type, and using the same frame type for more than one protocol is not a problem, but only one frame type per protocol.

page, click on  
LICENSED SOFTWARE

There you will be greeted with the following:

*Full Version Software Licensed for Member Personal Use*  
*These programs are individually password protected for members of The Institute for Network Professionals. These programs are not for resale and not licensed for production use.*  
*Members: Click here to get your passwords (requires live Internet connection).*

3. Click to get your passwords. You will be authenticated over the Inter-

net as a member. You will be asked to log in with your last name (lower case) and to use your 9 digit password—such as your Drake/ Sylvan ID number).

If you cannot log in, either you are not a current paid member, you have not provided your Drake/Sylvan ID number, or both. You can email your Drake/Sylvan number to **info@inpnet.org** or call the Institute at **801-223-9444** and your record will be updated. Access usually follows within one business day.

Once you log in, you can choose from various licensed programs on the CD. The unlock code will be emailed back to you within a few minutes.

When you receive the code via email, simply highlight it, and press Ctrl-C to copy it to the clipboard, then when you extract a program, you can press Ctrl-V when asked for the password.

*Look for more FAQs and tips about how to get the most out of your Institute Technical Resource CD in NICs, each month.* 

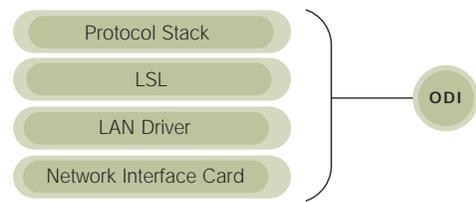
problem gets exponentially worse, since each server sees the other servers' translated packets and translates them again. Obviously, you want to minimize the number of frame types that you use with IPX. This same problem exists for any protocol stack bound to more than one frame type and routed somewhere on the network—not just IPX. So keep one frame type per protocol on your network. Each protocol can use a different frame type, and using the same frame type for more than one protocol is not a problem, but only one frame type per protocol.

### A Bit of Frame Type History

Originally Novell software running IPX on Ethernet used the Ethernet 802.3 (raw) frame type by default. Almost all installations used the default frame type because it was so hard to change. With the introduction of NetWare 3.12, NetWare 4.0, and Personal NetWare 1.0, Novell changed the default frame type for IPX on Ethernet to Ethernet 802.2.

The Ethernet 802.3 frame type does not have a field to specify the upper layer protocol used in the packet. So when a packet is received by an MLID (LAN driver) and

handed to the LSL (Link Support Layer), the LSL must guess which protocol stack to send the packet to (that should scare you). This is why the Ethernet 802.3 frame type does not work well in a multi-protocol environment. Novell has always put a 0xFFFF in the checksum field at the beginning of the IPX packet. The server uses this to make its guess. As a result, the IPX checksum field cannot be used for the Ethernet 802.3 frame type, and you cannot use security features such as packet signing. And if the Ethernet 802.3 frame type is used in a multiprotocol environment, it can contribute to intermittent server ABENDs. So don't use the Ethernet 802.3 frame type in a multiprotocol environment unless you have to—and migrate away from it as fast as you can.



2. The ODI layers.

or 100Mbit/s Ethernet by auto-sensing the line speed.

This hub contains two internal buses—one for 10Mbit/s traffic and another for 100Mbit/s traffic within the hub. The two buses are linked by an internal switch. Once the switch learns the addresses of the end stations, it isolates 10Mbit/s traffic to the 10Mbit/s bus and 100Mbit/s traffic to the 100Mbit/s bus; then the switch only forwards traffic between the buses when the destination address is for a node on the other speed bus. This feature is very helpful when you consider that many other hubs, when faced with even a single node that can only run at 10Mbit/s, will

force all of the nodes on the hub to run at 10Mbit/s.

The Accton hub provides you with an ideal platform to migrate your 10Mbit/s nodes up to 100Mbit/s over a period of time without forcing everyone to run at 10Mbit/s until every node is able to run at 100Mbit/s. This simplifies the current migration that all companies seem to be going through.

### Features

The hub has an intuitive front panel and indicators that simplify installation and network troubleshooting. The front panel tells what speed each port is running at (10 or 100Mbit/s), whether a port has an active link, and if a port has been disabled or is partitioned. The front panel

also shows traffic utilization on each of the two buses.

Port one has a three position switch to select the MII port on the back of the hub, or a MDI or MDI-X RJ-45 port on the front of the hub. All 12 RJ-45 ports can attach to 100BASE-TX media. The MII port on the back of the hub lets you attach to 100BASE-TX (operating at 100Mbit/s only), 100BASE-T4 or 100BASE-FX by plugging the appropriate transceiver into the MII connector.

Since the MII port is Class I, it can not be used to cascade this hub to another hub. Since you must select port one to use either the RJ-45 port on the front or the MII port on the back, you get a maximum of twelve ports with this hub.

Many hubs, when faced with even a single node that can only run at 10Mbit/s, force all nodes on the hub to run at 10Mbit/s.

### Why the Ethernet 802.3 Frame Type can be Dangerous in a Multiprotocol Environment

For a NetWare server acting as a router, when any protocol (IPX, IP, etc.) is bound to an MLID using the Ethernet 802.3 frame type, the LSL must guess which protocol stack to hand incoming packets to. This is because the Ethernet 802.3 frame type does not contain a PID (protocol ID) or Type field like the other three Ethernet frame types contain. (This field instructs the LSL which protocol stack the packet belongs to.)

So the LSL guesses by looking into the data portion of the frame. If the LSL finds 0xFFFF where IPX puts the checksum, then the LSL guesses that the packet must be for the IPX protocol stack and hands the frame to IPX (and Novell has always put 0xFFFF in the IPX checksum on a raw Ethernet 802.3 frame). If the frame is non-IPX using the Ethernet 802.3 frame type with 0xFFFF at the location the IPX would have it, then the LSL will hand this non-IPX frame to the IPX protocol stack. The location and length pairs at the beginning of the frame would be invalid numbers, causing the NetWare core to copy from the end of memory and ABEND the server. (It just takes one router

bound to 802.3 or an autodetecting network device.) This kind of ABEND is very hard to diagnose. The only good news is that usually only a couple of servers are affected because they ABEND before forwarding the bad packet.

#### More on Ethernet 802.3 Risks

To ease the migration from Ethernet 802.3 to Ethernet 802.2, Novell server installation software loads both frame types for IPX by default. So old nodes using Ethernet 802.3 can talk with new nodes using Ethernet 802.2, through translation by the new server's router. Old nodes can talk with each other and new nodes can talk with each other directly—without frame translation.

The problem is performance. As shown earlier, multiple frame types degrade performance needlessly. During my testing of the NetWare 5 beta versions, the server installation program seems to look at the network, determine all frame types in use, and binds IPX to each. I had a Moab server bind IPX to all four Ethernet frame types. If you are not careful when you install servers, they will bind multiple frame types to IPX. This leads to many extra frame copies uselessly consuming a lot of network bandwidth.

**If you are not careful when you install servers, they will bind multiple frame types to IPX. This leads to many extra frame copies uselessly consuming a lot of network bandwidth.**

The internal switch is a full-duplex 100Mbit/s store-and-forward switch. It is a learning switch that supports IEEE 802.1 transparent bridging functionality. It operates at the maximum packet filtering and forwarding rate for Ethernet. The routing table for the internal switch will hold up to 4K MAC addresses.

The hub has automatic partitioning features. It will isolate any port that has excessive collisions or jabber from the rest of the network and automatically reconnect it when the problem is resolved. It will also detect and adjust for incorrect wiring polarity on the receive pair of wires.

According to Accton, the hub is stackable. Generally, in our industry, stackable hubs mean that you can intercon-

nect more than one hub via a high speed backplane cable, so they operate like one physical hub. But Accton's use of the term stackable means that you can physically stack more than one of these hubs on top of each other and they will not have problems with heat, etc. This can be useful if you are in tight quarters such as a rack.

You can cascade up to 4 hubs in 10Mbit/s mode or 2 hubs in 100Mbit/s mode using a standard cross-over cable or the MDI port and a standard straight through cable. In 100Mbit/s mode, the hubs act as independent physical units. Each counts as one repeater in calculating the 5-4-3 rule for Ethernet. The hub is also rack mountable and includes brackets.

The hub's power supply autodetects input voltage, switching between 100V AC and 240V AC, and 50 and 60Hz.

The hub comes with a very good Installation Manual that describes installation and usage well. The manual also provides good support contact information and a very helpful glossary.

The hub is not manageable in that it does not support remote management via SNMP or the like.

Accton also makes a 24 port version of the hub (model 3024B).

#### Findings

I found the hub to be very easy to use. The hub held up very nicely under any load that I threw at it and kept running.

### Network Devices that Autodetect Frame Type

Another frame type problem is that certain devices and workstation clients autodetect the frame type by default. Windows 95, Windows NT, HP Laserjet 4SI printers, and other printers and print servers that directly connect to the network auto detect the frame type in use. Some devices lock in on the first frame type that they see and begin to operate. Others use thousands of packets as they attempt to auto detect what frame type they can communicate with. This is great for the manufacturer because in most instances you put the device on the network, turn it on, and it autodetects the frame type and works.

The problem with frame type autodetection is that the selected frame type may not be optimal for the network, potentially resulting in a lot of needless network traffic.

Also, a chosen frame type may prevent a device from communicating at all. For example, sometimes a device will not work—but when turned off and back on again, it operates correctly. (The device got the correct frame type the second time.) The best thing to do with such devices is to turn off frame type autodetection and set the frame type permanently to the frame type that you want the device to use.

The problem with frame type autodetection is that the selected frame type may not be optimal for the network, potentially resulting in a lot of needless network traffic.

And just because you think you set all network devices to use a single frame type doesn't mean that you didn't miss some. The best way to ensure that the frame types are set correctly is to test the network. But using an analyzer to look at the header of each captured packet to determine its frame type can be time-consuming.

A better way is to use physical network analysis software to identify which frame types are running on your network and which devices are using each frame type. For example, LANengineer has a screen summarizing packet distribution using each available frame type and a list of stations using each frame type. With this information, you can eliminate unwanted frame types and increase network performance dramatically. (Note: LANengineer is a network analysis tool I created and therefore use; References to LANengineer in this article are examples only. You can make your own conclusions about a network analysis tool. The point is, with effective tools and proactive network management, you're a much more valuable engineer; otherwise, you're just waiting for things to blow up and fixing them. Get under the hood.)

I could move wires of different speeds from port to port (while the hub was in operation!) and the hub always sensed the line speed and switched to the speed. Try as I might, I could not overload the internal switch. I even tried sending a high load of 100Mbit/s traffic across the internal switch to a slower 10Mbit/s station and the hub dealt with it properly. The street price for this hub is reasonable at about \$995. I was very impressed overall.

### Summary

- Allows both 100Mbit/s and 10Mbit/s traffic
- very usable front panel
- nice price. The hub rates a "Gotta have!" 🍌

versal skill that executives must hone to a razor's edge. Good leaders approach communications as a problem-solving discipline. What you say, where you say it, and how you say it create a portrait of who you are and affect how your leadership will be accepted" (Robert Dilenschneider, CEO, Hill & Knowlton).

### Listening

We communicate through our five senses and whenever we cannot use these senses, we may miss some of the complete meaning in an intended message. To overcome this as a listener you need to use as many senses as possible. When you

listen, focus on the speaker and write down or sketch what is being said. In one-on-one communication, repeat back what was said.

"We listen at one of five levels: ignoring, pretend listening, selective listening, attentive listening or empathic listening. People who listen at the first four levels often pursue personal motives. People who practice empathic listening try to discover what the other person really means and feels" (*The Seven Habits of Highly Effective People Learning Journal*).

To illustrate how you might listen at each level, let's look at several workplace scenarios:

Ignore. At lunch, the only empty seat is by someone you know to be

The remainder of this article discusses various frame-related problems and troubleshooting strategies.

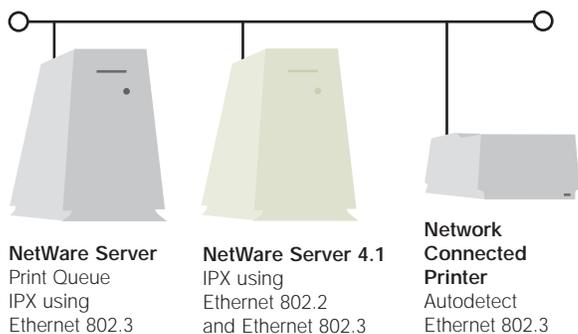
### Autodetection and Default Frame Types

In a frequently seen network performance problem, network devices that autodetect frame types inadvertently slow down the network. In one case an HP Laserjet 4M+ was directly connected to the network and printing from a queue on a network file server. A new NetWare 4.1 file server was added to the network, and its default frame types (IPX

using Ethernet 802.2 and Ethernet 802.3) were accidentally left running.

Several days later, when the printer was turned off then on again, it locked on an Ethernet 802.3 packet from the new NetWare 4.1 server first. From then on, every time the printer looked in the print queue for something to print, an Ethernet 802.3 packet went to the new server, was translated into Ethernet 802.2, and was sent to the print queue's file server. The response was returned in reverse. Each print job packet that the printer took from the queue on the print queue's file server was an Ethernet 802.2 packet that went to the new file server to be translated into Ethernet 802.3 and resent to the printer. Each packet had to be transmitted on the same LAN segment twice (once for each frame type). Coupled with latency in the router receiving, translating, and retransmitting the frame, frame translation inefficiency cut LAN speed by more than half. Simple print jobs took forever.

On networks where this has happened, I have used LANEngineer to identify the problem and removed the 802.3 frame type from the new server, leaving only the 802.2 frame type on the network. At restart, the printer autodetected the single 802.2 frame type, and the network ran at full speed



1. Virtual networks on a single physical network.

the gabby type. So you quickly open a trade magazine, sending the nonverbal message, "I don't plan to listen to you." Listening when you don't want to can be good practice in strengthening your communication skills, but if you need privacy, be polite and up front about it.

Pretend. It's Monday morning and you are just digging into your E-mail when a coworker stops to chat. You go about your work, giving only superficial attention. This dodge can be dangerous if your colleague thinks you are really listening—you may be inadvertently committing yourself to something you don't want to do or endorsing ideas you don't really agree with. Either listen fully or tell your colleague you'll get back with them later.

Selective. At the weekly staff meeting, something said invokes your strong reaction. Immediately you begin preparing a response in your head. While your attention is diverted, you miss an important deadline announcement. When you listen selectively, you limit your depth of understanding. Try taking notes to help you focus on the issue at hand and to record your reactions for later discussions.

Attentive. At a chapter meeting for your professional organization, a member reports on a solution you've been looking for. Possible benefit motivates to listen carefully.

Empathic. A coworker invites you to lunch to discuss trouble with the CIO. You agree to go, so long as you aren't

there to gossip or backbite. At lunch, you listen carefully, talking very little yourself, and then only to make sure you understand. You say things like: "As I understand it, you place a high value on . . .," "So as you see it . . .," or "I'm not sure I am with you, but see if this is how you felt." By engaging in empathic listening, you are focusing on the other person. You can develop this level of listening skill by repeating verbatim what has been said, rephrasing contents, reflecting feelings, or just being there as a sounding board. Don't give advice or use probing questions. Avoid giving interpretations based on your own experiences, and don't agree or disagree.

Empathic listening is a difficult skill to achieve and comes best with

**Good leaders approach communication as a problem-solving discipline. What you say creates a portrait of who you and determines how your leadership will be accepted.**

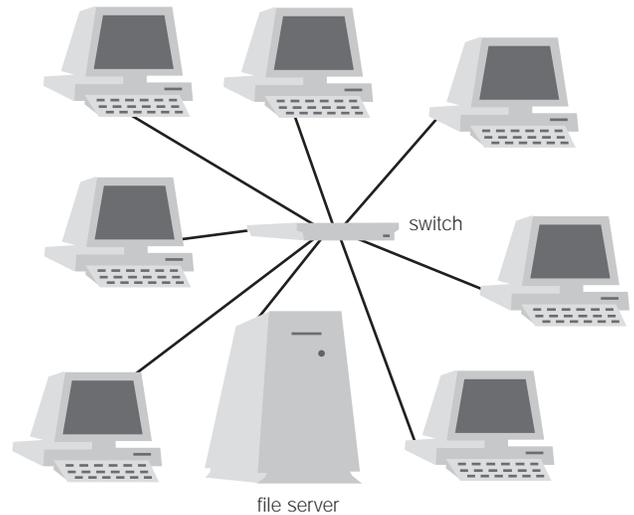
again. The final fix was to set the printer so it would use the Ethernet 802.2 frame type only and not autodetect.

### Switches and Proactive Testing

With the proliferation of switches, the need for proactive network stress testing has increased. Network switches can improve network performance by isolating traffic, so many conversations can take place through the switch at once. Instead of everyone contending for transmission time with everyone else's traffic, they only see the traffic intended for them. But this isolation creates a real problem in network testing. How do you really know that every port can communicate with every other port on the switch until they actually attempt to do so. Regularly stress testing every node's ability to communicate with every other node proactively tests this ability. I know of several instances where whole groups of nodes could not communicate with other groups of nodes due to switch problems. Regular use of a diagnostic tool like LANengineer to test communications between nodes will find such problems quickly.

### Conclusion

Although the physical network is often neglected after initial network installation, it plays a key role in successful network reliability and optimization. Good engineering along with effective physical network management soft-



4. Physical layout of a switch.

practice. Use it whenever trust levels are low, when you are not sure you've understood the other person, or when emotions are high. Seek clarification, and summarize what you think you've heard.

You can go a long way toward improving your professional communication by developing the skills of an empathic listener. This can be hard work, but the benefits in improved understanding and professional respect are worth the effort.

### Giving Information

We give information effectively by focussing on the person with whom

we are trying to communicate. Again we need to use as many senses as possible in sending a message: speak and write clearly, use visuals if possible, get feedback from the receiver, and ask for listener summaries. As you check for understanding, see if notes were taken or drawn.

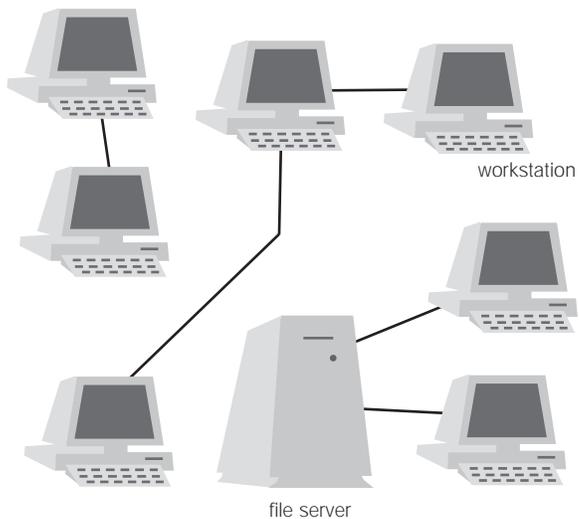
Many effective leaders use metaphors, object comparisons and word pictures to more fully get their message across to listeners. For example, while directing *Ordinary People*, Robert Redford played Pachelbel's Canon in D for his cinematographers. He clearly communicated his desire to match the suburban scene to the music and helped get his intended message across.

Or consider Bob Ross's UN Ambassador simile on page three of this *NICS*. Gary Smalley explains it this way: "When we awaken a person's emotions with a word picture, we add richness, intensity, and clarity to our communication. We plant within a listener a lasting seed that can grow into a changed life—even if they reject our words at first hearing" (*Hidden Keys to Loving Relationships*).

Knowing most communication comes from beyond words can be helpful in our electronic communication environment too. How much is missed or misunderstood in voice mail? This problem worsens with email, faxes, memos, and letters where no sound cues exist to ensure correct interpretation. Whenever we use these media, we need to

Listening when you don't want to can be good practice in strengthening your communication skills, but if you need privacy, be polite and up front about it.

ware will locate the source of poor network performance and provide the information network administrators need to optimize the system. By proactively managing the physical network, administrators can unlock their networks' potential.



5. Logical operation of a switch.

### More information

On Ethernet frame types:

"Migrating Ethernet Frame Types from 802.3 Raw to IEEE 802.2." *NetWare Application Notes*, Sep 93.

On ODI:

"Communication Basics and Open Data-Link Interface Technology." *NetWare Application Notes*, Nov 92.

On LANengineer:

[www.lanengineer.com](http://www.lanengineer.com)

*Bob Ross is an active voting member of IEEE 802.5 (Token-Ring committee) and holds the following certifications: CNE, MCNE, MCNI, CLSE, CLSI, CWSE, CWSI, MCT, CNP. He has been a software developer for over 20 years. At Novell, he worked on the OS/2 requester, NET.CFG file, ODI, LAN Driver and Protocol Stacks, Backup, LAN Management, Printing, Windows NT client, and Installation. He is currently President of LAN Utilities, L.L.C., a software development company in Pleasant Grove, UT developing custom NLMs, management software, LAN drivers, protocol stacks, etc. And he is the Past President of Northern Utah Chapter, Network Professional Association (NPA).* 

give extra consideration to hidden meanings in our words and come to recognize that face-to-face communication is often the best way to be sure we are really being understood.

### Retrieving Information

Most people store information they get in their heads. Professionals known for

outstanding memories have developed effective retrieval systems. These can include memorizing, abbreviations, memory-joggers, repeating information as it is given, note taking, and skillful use of references. Note taking is the most simple and powerful retrieval method since it provides a permanent record and use of several senses.

Whatever memory-enhancing method you use, don't rely on your memory alone for recollection.

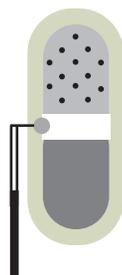
### Interpreting Information

In many cases information is given and received, but somehow communication doesn't result. Blocks to communication include motivation, conflict,

The information overload problem is not that we have too much information; it is that our tools are inadequate. We end up having to navigate a growing world of information with browsers that are not up to the task.

Repeat each sentence, emphasizing the highlighted word—you get eight distinct meanings:

tone:



- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8

- 1 I didn't say you have an attitude problem
- 2 I **didn't** say you have an attitude problem
- 3 I didn't **say** you have an attitude problem
- 4 I didn't say **you** have an attitude problem
- 5 I didn't say you **have** an attitude problem
- 6 I didn't say you have **an** attitude problem
- 7 I didn't say you have an **attitude** problem
- 8 I didn't say you have an attitude **problem**

experience, distractions and attitude. Here are some examples.

- One of the two parties did not think the information was very important.
- Verbal and non-verbal messages did not agree.
- Your own background or beliefs cause you not to accept what is said.
- You dislike the other person, so you filter what they say.
- Something else is on your mind or happens to shift your attention.
- You think you already know the topic.

It is easy to see how information is misinterpreted by filters like these, resulting in serious problems.

Most of us focus on the words we use when we convey thoughts, opinions, or information. But communications experts tell us that only seven percent of our communication is represented by spoken words. Another 38 percent come through the way we say and use sounds, and still another 55 percent are transmitted non-verbally, by body language (*The Seven Habits of Highly Effective People Learning Journal*).

So as communicators, we need to be aware of feelings expressed in our messages. Sometimes, as these feelings are disclosed, word emphasis and body language conflict with the message.

Good communication is critical to professional development. It is the founda-

tion of leadership skills. With practice and awareness of potential problems, you can improve your listening, giving, retrieving, and interpreting skills.

*The SoftSkills column is written for network computing and other technical professionals. In addition to continually updating technical skills and gaining work experience, technical experts need to develop professionally and use ethical practices.* 



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NICs Network Professional's Reference exists (1) to support the Institute's Technical Resource CD and (2) to give you something to read about your profession and technology when you're somewhere you'd just as soon not bring your laptop—computer.

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