



Home Networking

Susan: Hello and welcome to Tech Talk from the University of Minnesota; your source of information about the technology that surrounds us every day. I am your host, Susan McKinnell. Networking; it's important for people and it can help you get more out of computers too. After all, if there is one thing that computers are good at, it's communicating. So if you have more than one computer at home you might want to consider introducing them to each other. Some of the terms you'll hear include: intranet, NIC, access point and WPA. With me today is Trenton Raygor. Trent is a support technician with Academic and Distributed Computing Services here at the University of Minnesota. He spent most of his college career helping to build and support wired and wireless data networks at Minnesota State University in Mankato and he administers the computer network at a small nonprofit organization in St. Paul. It's great to have you here today, Trent.

Trent: Thanks, Susan.

Susan: So, why would I want a home network?

Trent: If you want to share files between multiple computers that are in your home, sharing printers or maybe just playing games if you're the gaming type.

Susan: Okay, so you mean sharing files if I have music on one and want to bring that over to the other, that kind of thing?

Trent: Yep.

Susan: Sharing printers? I could just have one printer and use it among different machines.

Trent: You could do that.

Susan: Great.

Trent: Some printers are actually network-ready and they'll be equipped with a network interface card. You also have the option when you're setting up a printer to share it and when you're setting it up you'll be asked if you want to share it on the network. Just make sure you file and printer sharing turned on.

Susan: Okay, great. So if I have just a standard user-end computer...uh...printer then I have that option when I'm setting it up.

Trent: Yes, correct.

Susan: Great! Now gaming; I'm not very big into gaming.

Trent: I'm not either actually.

Susan: Why would you want to share computers when you're gaming?

Trent: There are a lot of games out there that are network supported. People play games locally on intranets or even across the internet from other countries even.

Susan: So you mean different people, you've got one person at each machine and they're each playing on their own machine.

Trent: Correct. Correct.

Susan: Playing together at the same time?

Trent: I believe there is a game called Halo which is a very popular one.

Susan: And so they're all playing the same game at the same time.

Trent: Yes.

Susan: I suppose that sounds like fun. So you just said *intranet* and *internet*. What is the difference between them?

Trent: The intranet is something that is kind of self-contained. Internet is a network that has the option to talk to other networks.

Susan: So, we always use the term *The Internet* so that's the networks talking to other networks across the world. Something just inside my home would be an intranet?

Trent: Yes. Unless it was connected to say, a cable modem or something where you had internet access.

Susan: Would that be another reason to have some home networking going on so that I could share a connection to the internet.

Trent: Yes, definitely. Definitely; that's always an option.

Susan: Great.

Trent: Yeah, you'd probably need a router and some cables.

Susan: Okay, so you'd have to have that connection to the internet in the first place, with a cable modem I think you mentioned.

Trent: Yeah, a cable modem; a DSL modem.

Susan: And then some way to...okay. Sounds good. Now, we've got a lot of equipment here today and I know we want to do some networking between different computers but do I need all this?

Trent: Um, you don't necessarily need all this. You could actually set up a small network between two different machines just using that red cable over there.

Susan: This one right here?

Trent: Yep. It's called a crossover cable.

Susan: Hmm. Mm.

Trent: And it's just got a little different termination configuration than say that straight-through; that blue cable over there.

Susan: Okay. Now these look a little bit like my phone cord at home but I think the connector at the end seems to be a little bit bigger.

Trent: Yep, they're a little bigger.

Susan: And actually it looks a little bit like what I'm using to connect to my cable modem at home.

Trent: Yes.

Susan: It's the same kind of thing.

Trent: Yes.

Susan: Okay, but the cross over cable, you say, is different from the standard network cable. What am I going to do with this thing?

Trent: You're going to take that and plug it into this laptop here.

Susan: Okay, I want to see. This laptop has a hook. A hook? A spot right over here; what's my technical term for that?

Trent: It's going to look like a big phone jack but it's called an RJ45 jack.

Susan: Okay, and that's what this guy plugs into. Now how do I know that I've got that in my computer? Is any computer going to come with a hook up like this?

Trent: Usually these days it does. But you might want to check if you're buying a new machine that it does have a network interface card.

Susan: Network Interface Card, a NIC card?

Trent: NIC card.

Susan: Okay, I'm going to hook that guy in there and what am I going to do with that one?

Trent: Sure, and we'll hook that one in this machine over here. Okay. Now, what we've done here is we've configured this machine here and this machine to be on the same subnet with similar IP addresses.

Susan: This sounds complex! How am I going to figure out how to do this at home? I've need some software configuration is what you're saying.

Trent: Ah, yeah. A little bit and you can do that in the network control panel if you're curious you can always go to the help and support center within Windows.

Susan: I see you've got that called up right now.

Trent: We do have that.

Susan: You do a search on home networking; an easy term to look for. Okay and then what? There are lots of articles that come up, though. What am I looking for here?

Trent: Let's see if there's a network configuration.

Susan: And this is Windows XP.

Trent: Right, right.

Susan: Is it the...it looks like there is one of them here, *Walk through home networking*.

Trent: Yep. That's probably it.

Susan: So, right here in Windows it's just going to walk me through exactly what I want to do.

Trent: Correct.

Susan: Great! Does the Macintosh operating system have a similar help?

Trent: Yeah, it'll be similar.

Susan: I mean, obviously, it's going to be different directions for the Macintosh than it is for Windows but it's still going to help me walk through what I need to do to set up on here. Great. So we've already got the software set up and we've got the physical connection. How am I going to get stuff over?

Trent: Um, okay, since this is all configured and we have a file on our desktop pc over here, we're going to go to *My network places* and look, view workgroup computers here.

Susan: Oh, I see.

Trent: Because we have it set up so this is on the same work group.

Susan: Great, now we're in here I see one on *My Documents* it's called homework.

Trent: Right.

Susan: Right. Then right here we can see Trent's PC. Great!

Trent: Yep.

Susan: So what are we going to do? Are we going to just open it up?

Trent: Yep.

Susan: Mm. Hmm.

Trent: Open it up.

Susan: I'm going to play around here if I can.

Trent: Sure.

Susan: Okay, then go into My Documents.

Trent: My documents.

Susan: And I'm going to drag this right over. Is that what I do? Drag it over to the desktop?

Trent: Yep; very easy.

Susan: And there it is.

Trent: Yep.

Susan: Fabulous. Okay. I wanted to take a look at some of the other things that we have here because we do have lots of fun stuff. Now, this guy right here—I ought to be careful touching this because obviously I don't want to touch any of the connections—what is this guy right here?

Trent: That's a NIC card; a Network Interface Card.

Susan: So this is the same thing that I have in both of these computers?

Trent: Yes. It's integrated as opposed to this card here which is a PCI slot card. All of the cards...actually most of the cards come with laptop computers these days are integrated into the motherboard.

Susan: Okay, so in other words when I bought this...well I didn't buy this...but when somebody bought this laptop it's all built in together. This might be for someone who's got an older, maybe, desktop and doesn't have a network connection; they can purchase one of these.

Trent: Yeah.

Susan: Great. At any computer supply store?

Trent: Most, yeah.

Susan: Pretty much?

Trent: And they're very cheap; I mean you can get one for ten dollars.

Susan: Okay. Now, just to clarify, this crossover cable that we just used was connecting these two machines directly together. Why would I use this cable?

Trent: That's a straight-through cable; straight through configuration in a home networking situation and maybe with that wall plate over there you see it's got an RJ45 connector in there.

Susan: Okay is that this yellow one?

Trent: It's the yellow one; correct

Susan: Okay and so I could just install this in my wall.

Trent: Correct.

Susan: Connect something like this to it. Now I've had lots of other...So, I'm sorry how would I use this.

Trent: You would connect this to your laptop and plug it into the wall there. And considering you'd have to have some wires installed.

Susan: Obviously, yeah. I might hire someone to install those wires, possibly.

Trent: That would need to be done and then those wires would be brought back and terminated to a router.

Susan: Okay and a router is a piece of equipment, again, that I can get at a computer supply store.

Trent: Yep, correct.

Susan: And what does a router do, exactly?

Trent: It kind of does what it says. It routes internet traffic.

Susan: Fabulous. So in other words with a router I could connect this computer to the router; that computer to the router and they'd be able to talk to each other?

Trent: Right.

Susan: Okay. What else do I have on this little plate? Because it's a fun plate.

Trent: Ah, there is a video connection there, there is a phone; a voice connection.

Susan: Now, you're going to have to tell, now, this is a phone one.

Trent: Yeah, that's an RJ12; that's a voice connection.

Susan: And this one here?

Trent: That's video.

Susan: And this one here?

Trent: That's one's going to be audio.

Susan: So this is like, you know, if I really want a good system going through my home, I'd use it for my computer and obviously for phone...

Trent: Yep.

Susan: Fabulous! The one last thing that I really wanted to check on is if I've got two computers connected and I am connecting them to the internet, do I have any additional security things I want to be concerned about?

Trent: Yeah, you're going to want to keep it in mind. You're definitely going to want to run Windows firewall if you're using a Windows XP machine.

Susan: Mm. Hmm. and Macintosh also has a firewall.

Trent: Right; correct. There are other firewall products out there as well. But you can use Symantec client security, it's a firewall that's built-in. Also keep in mind when you are turning on file and printer sharing. It's not the most secure thing.

Susan: Now, you have to turn that on in order share a file.

Trent: In order to share files and printers; correct.

Susan: So, by having a home network, security becomes...if I'm just connecting in my home, if I'm just doing what I'm doing right here, I'm just connecting these two, I'm not connecting to the outside world I don't really need to worry that much, right?

Trent: Not very much, no.

Susan: Okay, because no one else is getting in here. But once I connect to the internet, security is something that I should start taking a look at. We're going to talk about that just a little more; we've got a little piece about that. Thank you so much for being with us here, today, Trent.

Trent: Thank you.

Susan: Now that we know how to put together a home network, we need to make it secure. With just a few precautions you can keep a network as safe as a single computer.

Animated segment-

The first thing to do is to make sure that each of the computers on the network is protected individually. Follow these guidelines: First, make sure everything is up to date. Windows XP users, you should be

running service pack 2 and getting regular automatic updates. Mac users, you'll want to make sure your computers are current as well. Next, install and run a firewall on each of the computers in your home network. If you're running an up-to-date Windows XP or Mac OSX system, you have a firewall installed already, but check your security settings to make sure that it's on. The next step is to install and run antivirus software. This also needs to be kept current with frequent, even daily, updates. Finally, work to keep spyware off of your computer. You can do this with programs such as, AdAware and Spybot search and destroy. These programs are available for free online at download.com. Now that you've secured the parts of your network you need to protect the whole thing. The easiest way to do this is with a router with a built-in firewall. Check with your router's manufacturer to see if it's protected. Finally, if you are using one of your computers to connect to the internet and then sharing that connection with the rest of your machines, you need to make sure that the internet connected computer is always patched, up-to-date and running its firewall.

Susan: It may seem like a lot of work, but taking a few steps to secure your home network is well worth it and it will help you feel at ease. We've discussed wired networks but there is also the option of going wireless. Our next guest is Peter Oberg. Pete works at the University of Minnesota for Academic and Distributed Computing Services. He has been employed at the University since 1983 and has provided both mainframe and microcomputer software and hardware support to staff, faculty and students. Pete is known to some people at the University as the guy who goes around on rollerblades installing the wireless network. Pete, thank you for joining us again today.

Pete: Thanks for having me.

Susan: Now, I spoke at length with Trent about how to hook things up with wires. How do I do it wireless? What's the deal with this?

Pete: The main difference is that we have some equipment here out in front of us that we can use in the wireless environment and everything that Trent said in his part stays true; that there are four means of connecting wireless so that you or I or our audience at home would have a connection to either the intranet or the internet.

Susan: Okay.

Pete: And that is through, if we turn one around, you'll see the ports, and one of them will go to number one, either...

Susan: They're numbered right over here.

Pete: Mm. Hmm. The router they are using in their home because you'll have several connections as for printers or hardware connections with laptops or desktop computers and your printers.

Susan: Okay. So I have options here. I've got the one on the left...Now, these all take a cable like the one we were looking at with Trent, this RJ45 network cable.

Pete: That's correct.

Susan: This is not a crossover one because a crossover is just one computer to the other.

Pete: Correct.

Susan: So, I'd hook the first one...if I wanted to connect to the internet.

Pete: Correct.

Susan: ...to my cable modem or DSL modem?

Pete: So the first one is either the router that you're using with your cable modem or DSL service or go directly to your DSL modem or cable modem.

Susan: Okay, so I could hook this to a separate router if I wanted to.

Pete: Right.

Susan: Does this also act as a router too, doesn't it?

Pete: That's correct.

Susan: Because it has these separate options, again, a router is just a piece of equipment that connects different computers or printers.

Pete: Right.

Susan: Okay. I'm catching on here. Okay, so these other options here that you said we could hook up another computer with a wire if we wanted to.

Pete: With a wire as well.

Susan: And we could hook up a printer. So, this could act just as a wired router if I wanted?

Pete: Right.

Susan: But we've got these antennas too so what is this doing.

Pete: Okay, and so when the wireless is turned on in your configuration then it will broadcast using radio frequencies to a laptop or a desktop computer using a device that's called either a PCI wireless card, there's also a USB standard if you have a USB connection in your laptop and/or if, as Trent said earlier, there is also a card that goes into a desktop that can also be wireless.

Susan: Now we were looking at a NIC card earlier that was specifically with a wired connection but it's something similar that is going to be just for wireless.

Peter: That's correct.

Susan: Now, if I buy a new computer I can buy one that already has one in there, whether it's a laptop or desktop.

Peter: That's correct.

Susan: I just want to show this laptop, though, has this kind of wireless card so if I've got a laptop that doesn't have wireless yet, I could purchase one and it might have a hookup that looks something like this.

Peter: Right. And so in the electronics store or over the internet if that's where you're purchasing it, it's called an external. PCMCIA network interface card for wireless and the reason why I just say that is that you'll see that on the box, so that they're not taken back.

Susan: Yeah, okay, it may sound intimidating but it just means one of these little cards. And I'd assume that there's some software that you'd install along with this. There's probably a CD that comes along with it. Let's see if I can get this guy back in there; pretty easy to hook in and out. Again, if you're buying a new one you might want to get it already in there. You might already have it in there if you have one too.

Pete: Sure. For our audience, so they know as well, when we now go purchase a laptop, there is also one usually now installed by default it's buried under the keyboard and that's called a mini PCI wireless card.

Susan: And that's one of those things you want to look into if you're buying a new laptop. Most new laptops do have wireless already, but still you want to double check if you get, maybe the cheapest out there you might want to check to see if it actually has that wireless capability.

Pete: Right.

Susan: Okay, let's take a look at this real quick. This is another type of router isn't it?

Pete: That is correct.

Susan: So, similar to this.

Pete: Similar to this, it has less spickets. Meaning it has less of what we call the RJ45 connectors if you're going to...there's a place for a printer and a connection for going directly to your cable modem, DSL or a router whichever you're using plus one extra one if you don't have that service at home and you want to go directly to your phone line, you can plug what we call the RJ11 cable from your phone line in.

Susan: RJ11 is just a standard phone cord, right?

Pete: Right.

Susan: Absolutely. Great. So, what you're saying is with this I can connect to the internet with a phone cord, connect a printer to this or a computer to this via the wire and also have my wireless computer as well.

Pete: Correct.

Susan: This one doesn't have the phone cord option. I could use the cable modem or the DSL modem. Just to clarify, so if I've got my printer connected to one of these, I've got my wireless

laptop or desktop, that means that I could take my laptop or desktop, put it anywhere in my house that can get the signal and print without connecting with a wire.

Pete: Right.

Susan: Okay that's fabulous. And I can connect to the internet without connecting with a wire.

Pete: Right.

Susan: Now, I just said "anywhere in the house;" Do I need to think about where I am putting these routers?

Pete: Good; very good question. So after purchasing the wireless access point and your adapter think of it as when you are going to purchase a home. Often everybody talks about location, location, location. So that wherever you are the signal strength is strong enough emanating from these units that have a transmitter in them, so that's strong enough to talk to it.

Susan: Okay.

Pete: And that usually will be in the middle of a house, or an apartment complex, depending on if you're sharing. So an example is, say that you have a rambler style home it would be best not to put it at one end of the house but put it in the middle.

Susan: Because it might not to the other...

Pete: The other end.

Susan: You know you put your radio or your television in certain places because the reception is not as good in some places as it is in other places, so...

Pete: That's right.

Susan: So maybe some experimentation might be necessary?

Pete: So if the technician is there who is installing that service, whether it's the DSL or your cable modem service, you could try it quick if you purchased it—great idea.

Susan: Okay, so what you're saying is that if I am having someone put in a high speed access. I want to consider where that access point is because if I'm going to hook it straight to my wireless, I want to be able to get that wireless throughout the house and I want this wireless to be close to my DSL or cable modem.

Pete: Right.

Susan: Because that has to be connected with a wire.

Pete: That's right.

Susan: So, okay, so if I have the chance, I want to check that out to see if I'm going to be able to connect from other places in the house. Is there anything other than distance that's going to affect where I am putting my routers and how they work?

Pete: As you said earlier, we talked about distance and we talked a little bit about what could be between the device and your laptop or desktop and so that would be interference. Maybe we should talk about that for a moment.

Susan: Absolutely.

Pete: Okay, one of the things to consider is because these are using radio frequencies there is other equipment in your house that also does that. First, number one, is the portable phones—different than your cell phone. It transmits in the same frequency...

Susan: The cordless phone I have in my own house...

Pete: That's correct. It might be in what we call the 2.4 gigahertz range.

Susan: I've seen that on the box in stores when I'm buying my portable phone, it says 2.4 gigahertz, but there are some other options too.

Pete: So when they are purchasing they need to take that into account, if they have that, because on the box it does tell you what the power is being generated to emanate that, you know, transmission and it's in milliwatts. If it's higher than the units that you're purchasing on your portable phone that could cut your connection as you're talking, browsing the web, answering emails, that type of thing.

Susan: So, in that case do I want to look for a different type of cordless phone or do I want to make sure it's in a specific place in my house? How can I work around this problem?

Pete: Right. And so the answer is that you would want to choose one...you'd want to change the phone service. Some units you can dial or choose a channel on your portable phone, but not all models. So, keep that in mind.

Susan: That's another good place to look for trouble shooting, though. You hook up your wireless, you think it's going to work great; it doesn't. Take a look at the cordless phone and see if that's the culprit.

Pete: Right. That's one. Two, microwave ovens, they, as you might expect when you think of all the people pop popcorn and it goes for three minutes or maybe if it's dinner time and you put something in for 20 minutes, that also sends out radio frequencies that can interrupt the transmission in the wireless unit if someone is using it at that point.

Susan: Okay. And that's the sort of thing that is going to be temporary as soon as they stop using the microwave, you're not going to have too many problems. Anything else?

Pete: Sure. A couple of fun ones, if you have little ones in the house, baby monitors can also interrupt.

Susan: Of course because those are working on radio frequencies as well.

Pete: Right. Lastly, those that are in apartments, when you might have surveillance equipment. That's often wireless as well. That's fairly new now as far as being recognized as an interference problem and that you may need to check with your front desk or whoever the manager is at the apartment complex.

Susan: So it sounds like you can hook it up; that's fine. But, there may be some experimentation to figure out, you know, to get the best signal and to make sure everything's working. Fabulous! Anything else about the structure of my house?

Pete: It does. As far as structure goes, anything that is sheetrock and wood is actually an excellent conduit to send radio frequency through. The worst material is usually anything that is in bathrooms; that is tile.

Susan: Ceramic tile.

Pete: Tile that has the glazing on it and so your radio frequency...

Susan: Does the signal actually bounce right off of that?

Pete: It will bounce right off of that. Also, a second thing, and this would be in an apartment complexes if there are areas where there might be glass with the wire mesh in it. That's just an actual shield as it happens and it just stops the signal; just like that.

Susan: Okay, lots of things to consider. I wanted to ask you, we had a whole bit about security earlier. Are there any extra security considerations when using wireless?

Pete: Sure. Let's talk about the configuration of these and that is for those that are in your neighborhood and how you want to configure these access points and again, it's a very, what we call, easy configuration where it talks about IP addresses first. And one that I like to talk about for those that have DSL service; some DSL services around the country do not allow automatic IP address, or static IP addressing.

Susan: Okay.

Pete: They use what we call a point-to-point protocol over Ethernet and that's one of the things to be aware of when configuration that people do not think about and you do need to consult the documentation that came from your phone service about that DSL service.

Susan: So you might need to double check with who you got your service with. Just to clarify, IP, again, is that specific number that everyone needs when they connect to the internet.

Pete: That correct.

Susan: Great. What about setting up a password or something like that. Do I need to do anything like that?

Pete: Okay. Yes, that's point number two. So then to limit who can use your wireless environment we can set a password called, it's now moved to a new tech protocol called, WPA, Wi-Fi Protected Access, that has increased what we call the encryption of the information that is sent over the airwaves and does not allow people to easily with a program capture the packets that are being sent from the laptop to your

wireless device and say, “oh I can see someone’s credit card, social security number, or maybe you’re doing a purchase.

Susan: this sounds like a really important thing, to make sure that set up the WPA that’s going to be clear in the documentation that comes with my router.

Pete: That’s correct—not with the router, but the wireless device.

Susan: The wireless device! Fabulous! Well, thank you so much for all of the information you’ve given us today, Pete.

Pete: Thank you.

Susan: It’s always great to have you here. There’s a lot to know about networking home computers. Here is just a brief review of what we’ve covered *for your files*.

Trenten Raygor, technical specialist at the University said that there are multiple reasons you may want to have a home network.

If you want to share files between multiple computers that are in your home, sharing printers... Some printers are actually network ready and they’ll be equipped with a network interface card. You also have the option when you’re setting up a printer to share it and when you’re setting it up you’ll be asked if you want to share it on the network. Just make sure you have file and printer sharing turned on.

Susan VO: Trent explained the difference between intranet and internet.

Trent: An intranet is something that’s kind of self-contained. An Internet is a network that has the option to talk to other networks.

Susan VO: Trent told us that if you are connecting computers to the internet you should...

Trent: You are definitely going to want to run Window firewall if you are using a Windows XP machine. (And Macintosh also has a firewall.) There are firewall products out there as well. You can use Symantec Security has a firewall built in. Also keep in mind when you’re turning on file and printer sharing. It’s not the most secure thing.

Susan VO: Peter Oberg, wireless networking expert at the U, told us that when you set up your wireless network keep in mind...

Peter: Location, location, location – so that wherever you are, the signal strength is strong enough emanating from these units that have a transmitter in them so that it’s strong enough to talk to it. And that is usually will be in the middle of a house. So, or an apartment complex depending upon if you’re sharing. So an example is if you have a rambler style home, it would be best not to put it at one end of the house but put it in the middle.

Susan VO: Peter also cautioned that there are items in everyone’s home that use radio frequencies and can cause interference for your wireless network.

Pete: First, number one, is the portable phones – different than your cell phones. It transmits in the same frequency and in this case

Susan: Just like the cordless phone I have in my own house

Pete: That's correct. Two, microwave ovens, that also sends out radio frequencies that can interrupt the transmission of your wireless unit if someone using it at that point. If you have little ones in the house, baby monitors can.

Susan: Of course, because those are working on radio frequencies as well.

Pete: Okay and then, lastly those that are in apartments where you might have surveillance equipment, that's often wireless as well and that's fairly new now as far as being recognized as an interference problem.

Susan VO: Lastly, Pete discussed how you can limit those who can use your wireless environment.

Pete: We can set a password, called, it's now moved to a tech protocol called WPA, wi-fi protected access that has increased what we call the encryption of the information that is sent over the airwaves. And it does not allow people to easily with a program capture the packets that are being sent from the laptop to your wireless device.

Susan: Remember that if you have any questions about home networking, you can post it on our website and we'll have one of our specialists answer it. The address is Techtalk.umn.edu. Next week we'll take a look at some of the latest ways to store your data. It's not about floppy disks anymore. So, be sure to turn into Tech Talk. Until next time, I'm Susan McKinnell.

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Executive Producer

Robert H. Bruininks

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Steve Cawley

Shih-Pau Yen

Host

Susan McKinnell

Producer / Director

Susan J. Tade

Assistant Director

Rich Reardon

Technical Director

Steve Barbo

Scriptwriters

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Audio

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