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IHE NA Connectathon 2015: Network

Network Sharing Rules

I would hate the rules to get lost in the technical description of the network. The network is a resource shared by over 400 engineers and staff members. We are documenting the rules for NA Connectathon 2015.

We present several rules designed to protect the shared resources of the event. If we find that you are violating the explicit rules or the spirit of the rules:

- First time: Friendly warning with a request to follow the party line.

- Second time: It should not come to this.

Wireless

1. Do not bring your own wireless access points. The network group will provide wireless access.

    a. There is one PCD company that we know of that has a wireless device that uses older technology. Please contact Steve Moore for a brief discussion.

    b. If you are bringing an internal switch that happens to have wireless, you will need to know how to turn off the wireless. That does not mean "We are not using the wireless". That means you are not allowed to have a device that is broadcasting wireless.

    c. This means you should not bring MiFi devices or anything that is equivalent.

2. Many of you have devices with both wired and wireless interfaces.

    a. Use the wired interface. Performance, reliability and security will be better.

    b. TURN OFF the wireless interface.

3. We know everyone now has an iPAD or similar device. These all generate traffic. Turn them off unless they are being used for testing.

4. If your cell phone has the ability to create a wireless hotspot, turn that off.

5. Configure your cell phone to use the cell network and not piggy back off the wireless network. Yes, your reception may not be as good, but we need to protect the wireless network for testing.

Network Disruption: Traffic, Rogue IP Addresses

6. Any of the items listed below are not allowed during the hours of **08:00** and **18:00** each day.

    a. Streaming video is not allowed. That includes Skype video sessions.

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    b. Streaming audio is not allowed. Bring your own music on your laptop. Skype calls (audio only) are allowed.

    c. Peer-to-peer file sharing (Limewire, BitTorrent, etc) is not allowed.

    d. Downloading large files (unless they are work related)

7. Do not disrupt the network by attaching a device (switch) that is configured incorrectly. The most common problem:

    a. Attaching your switch to the Connectathon network using the port that puts out DHCP addresses.

    b. Connecting cables in a fashion that causes a bridge loop. If you need assistance in connecting a cable, please see the Network Staff.

    c. The long and short of this rule is: If you bring network gear, know how to use it.

8. Do not do the following:

    a. Configure any of your equipment to assign DHCP addresses. We are already on a private network. We will give you as many fixed IP addresses as you need.

    b. Configure your VMWare or any other VM host implementation such that they assign DHCP addresses. Use fixed IP addresses.

9. We allocate fixed IP addresses to you in advance. Take the time to know your IP address. You are not given a range. Do not just pick an address that you think is empty.

Anti Virus Software

10. All systems are required to have active and up to date anti-virus software. Relevant operating system security patches should be installed. Ports that are not needed by other participants should be blocked by a software or hardware firewall at your table.

Room Configuration and IP Assignments

In the discussion below, we will use the word **system** to refer to the concept of a system that is registered in Gazelle for testing. A **system** is a collection of IHE actors that might be implemented with one or more **computers**. A **computer** is a physical computer, a virtual machine, a wireless thingy or anything that will need an IP address.

The figure on the last page shows a layout of the testing area with north at the top. Tables are arranged in *sectors*. For example, tables E11-E18/F11-F18 combine to form one *sector*. Each *sector* has two rows of **tables**. Each system registered for testing is assigned to one **table**. For example, your **table** number might be E11, F12, or M36. The spacing in the figure is meant to convey table spacing, but is not to scale.

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Each *sector* (AB-11, AB-21, AB-31, CD-11, …) will be configured as its own subnet. Systems using fixed IP addresses will need to be aware of the network parameters that are listed below.

Subnet Connections

Each subnet will have a switch that will route traffic between subnets. Switches will be configured to keep local traffic in your *sector* but <u>will</u> allow traffic between the subnets. The network is designed so that any **computer** can communicate with any other **computer** on the network. If you configure your netmask and default gateway properly, it will work.

Fixed IP Addresses

Each physical sector corresponds to one subnet on our network. Each **computer** that needs a fixed IP address will be assigned an IP address that is only valid for that subnet. That is, if you plug in your computer in your *sector* (e.g., CD-11), your fixed IP address will work in that *sector*.

- **If you take your computer with that fixed IP address and try to plug in at a different sector, your network connection will not work. This is by design.**

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DHCP Addresses / Wired

If you want to connect to the network but don't require a fixed IP address for testing, you can make a **wired** connection and get a DHCP address. This is the preferred method if you do not require a static IP address for testing. Your DHCP address will be on the same subnet as the fixed IP addresses in your *sector*. If you take your laptop and move to a different sector, you will need a new DHCP address. When you disconnect your laptop and physically move to a different sector, the DHCP logic will take care of this for you.

You should know how to release/renew your DHCP lease. If that last sentence does not compute, ask your network folks before you get on the plane.

Connectathon Wireless

The network contractor will work with the convention center staff and provide two wireless networks for participant use. One wireless network will be provided for general participant use.

The wireless network parameters are:

Description	SSID	Password	Security type
General Connectathon	NA2015	cleveland15	WPA-MIXED/AES

The wireless network will not have the same performance characteristics as the wired network. You will be able to connect to any device on the network, but on average, your wireless connection will be slower than a wired connection. If at all possible, **turn off** your wireless interface and use the wired connection.

Switch / Router / Firewall

Each of the *sectors* will have **one** Cisco switch in the middle. **We are asking that you provide your own cable (singular) and make a connection to the switch located in the center of your sector.** We ask that each table use only one connection. If you need extra connections we encourage you to bring a small switch of your own (a switch only, please do not bring a router or firewall if you only need extra fanout) Also, DO NOT use the switch ports on the back of a router or firewall as a switch. We have seen this in the past and it causes major problems on the network.

- This is different for January 2015. The network group is **not** providing small switches at the ends of the sectors. If you are at the end tables of a sector (11, 12, 17, 18, 21, 22, 27, 28 …), you will have to bring a long cable to reach the switch. Each table is 6 feet; you could be 4 tables away from the switch. You could be as far as …… 24 feet, or 8 meters from the switch.

If you plan on bringing a router or firewall I want you to think about why you are bringing it. Please remember that the Connect-a-thon network is already firewalled. Routers and firewalls that are configured incorrectly can cause major problems for you and others on the network. If you do decide to bring a router or firewall remember that it is your responsibility to make sure it is configured correctly. **The only connection to our network will be on the WAN or Outside port of your device.**

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Public IP Addresses / Offsite Data Centers

The Connectathon is set up to have all equipment on a private network inside the hotel testing area. Invariably, a few groups will indicate they have monster computers in data centers that cannot be transported. You can run your applications on your data center, but all network risk associated with that is yours. If there is a network problem from the hotel to your site that prevents you from completing testing, the sponsors will take no responsibility for that. Your Connectathon partners are on a private network inside the hotel. If your off-site equipment needs to initiate a connection to different testing partners who are inside the Connectathon firewall, you will need to work with the Network Staff to make certain you can establish those connections.

Some participants will tell me that they need a public IP address for a computer within the test area so that folks from back home can access their software. The Convention Center will create a small number of VPN accounts that Steve Moore will allocate on a per request basis. Please only request a VPN account if you have the need; do not request a VPN account "just because I might need it."

Network Parameters

The table below lists network parameters that are used by everyone; they are not tied to your subnet. If you use DNS1 as your first server, that will be tied to Gazelle and will resolve names in our test/ihe.net domain. That is, the host names that you see in gazelle (mir1.ihe-us-test.net) will be resolved by DNS1. DNS1 will also resolve external IP addresses so you can surf to Amazon. You can also add DNS2 as a backup for external address resolution.

Do not place DNS2 before DNS1 in your configuration. That would mean that any network connection you make would first search DNS2, fail and then switch over to DNS1.

DNS 1 (same for all, tied to Gazelle)	10.242.100.2
DNS 2	8.8.8.8
Netmask	255.255.255.0
Domain Name	ihe-us-test.net

These parameters mean that the fully qualified name of a computer as seen by your partners will be something similar to: **acme0.ihe-us-test.net**.

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Why Must I Use the Hostname for my Computer from Gazelle?

You do not have to change the hostname of your computer as your computer knows it. You only have to make sure that your computer responds to the IP address that is assigned in Gazelle. Other participants will use DNS to lookup **acme0.ihe-us-test.net**. If you built your system five months ago and the hostname as you know it is bambi, the network connections will still work. All you need to remember:

1. Your test partners will find your IP address by performing a look-up of **acme0.ihe-us-test.net**.

2. Inbound http connections to your system may include **acme0.ihe-us-test.net**.

The next table maps table number to subnet information.

Sector	Comment	Subnet	Gateway	Fixed IP range	DHCP IP range
AB-11	Overflow	10.242.11.x	10.242.11.1	11-150	151-250
AB-21	Staff / Participant	10.242.12.x	10.242.12.1	11-150	151-250
AB-31	New Directions	10.242.13.x	10.242.13.1	11-150	151-250
AB-41	Overflow	10.242.14.x	10.242.14.1	11-150	151-250
CD-11	Participant	10.242.21.x	10.242.21.1	11-150	151-250
CD-21	Participant	10.242.22.x	10.242.22.1	11-150	151-250
CD-31	Participant	10.242.23.x	10.242.23.1	11-150	151-250
CD-41	Participant	10.242.24.x	10.242.24.1	11-150	151-250
EF-11	Participant	10.242.31.x	10.242.31.1	11-150	151-250
EF-21	Participant	10.242.32.x	10.242.32.1	11-150	151-250
EF-31	Participant	10.242.33.x	10.242.33.1	11-150	151-250
EF-41	Participant	10.242.34.x	10.242.34.1	11-150	151-250
GH-11	Participant	10.242.41.x	10.242.41.1	11-150	151-250
GH-21	Participant	10.242.42.x	10.242.42.1	11-150	151-250
GH-31	Monitors	10.242.43.x	10.242.43.1	11-150	151-250
GH-41	Participant	10.242.44.x	10.242.44.1	11-150	151-250
JK-11	Participant	10.242.51.x	10.242.51.1	11-150	151-250

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JK-21	Monitors	10.242.52.x	10.242.52.1	11-150	151-250
JK-31	Monitors	10.242.53.x	10.242.53.1	11-150	151-250
JK-41	Participant	10.242.54.x	10.242.54.1	11-150	151-250
LM-11	Participant	10.242.61.x	10.242.61.1	11-150	151-250
LM-21	Mgmt / Participant	10.242.62.x	10.242.62.1	11-150	151-250
LM-31	Participant	10.242.63.x	10.242.63.1	11-150	151-250

Interpretation of Network Parameters

1. We will assign fixed IP addresses to each computer that needs one. Your fixed IP address will be on your subnet in the range of 10.242.x.11 through 10.242.x.150. Do not configure any fixed IP addresses that are not in that range.

2. If you plug into the wired network using DHCP, you will be granted an IP address in the range of 10.242.x.151 through 10.242.x.250. If you are using DHCP and your address is not in that range, something is not right. Please release your DHCP address and try again.

Special Tables

Network Support Staff	J31-J33
DNS Help	With network staff: J31-J33
Connectathon Manager (Felhofer)	M28
Network policy questions	• First: network staff J31 - J33 • Second: Moore H31

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Network Debugging Tips

This section contains no rules. It contains suggestions from a **non-network engineer** (Steve Moore) who has observed Connect-a-thon participants with connectivity problems. We have a network contractor on site to run the network and project managers who are familiar with network problems. However, we expect you to be able to configure your own equipment and understand how to track down network problems. You won't be able to fix a problem if there are two gateways that do not communicate. However, if you approach the network group or project managers and say "The network is broken" or "It doesn't work", we will point you back to this document and ask you to provide better diagnostic information.

While the steps listed below may not be optimal for debugging network problems, these are the steps I will ask you to run if you come to me (Steve Moore) for network help.

The Network Staff are on-site to keep the network operational and to handle any issues you may encounter in using the network. Please come see the Network Staff if you are having issues with the network.

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Client Application Cannot Send a Message of Type X to Server Y, Port Z

Step	Question	If Yes	If No
1	Open a terminal emulator on your computer. Enter this command: **telnet host port** where host/port match your target application Do you get a connection? If you do not have telnet, use the MESA tool: tcp_connect	To kill the telnet connection, hit "Ctrl]". That will get you back to the telnet prompt. Enter "quit" Conclusion: Your network connection is fine; you have an application problem.	Step 2
2	Can you ping the other computer?	Then they either have a hardware/software firewall that is blocking the port or their application is not listening. Go talk to them.	This does not mean their computer is down or that the network is down either. They might block ICMP. Continue to Step 3
3	Is the target computer on a different subnet from you?	Determine if you have network connections to the other subnet, starting at step 3.1	Step 4
3.1	First check for local network connections by following these steps.		
3.2	Can you ping or connect to a computer located at your table (your switch)?	Step 3.3	Then it is local to your table.
3.3	Can you ping your default gateway (10.242.x.1)?	Step 3.5	Then, it is a problem in your sector. Step 3.4
3.4	Can your neighbor at an adjoining table ping the gateway?	Wow, scratch your head	Talk to the network contractor
3.5	Can you ping the default gateway on the subnet with the target computer?	You have a network connection to their sector, but not to that port on their computer. They might not respond to ping. You have more work to do. Step 3.6	Network problem. Talk to the network contractor.
3.6	Can you connect to anything that might be on their box? Use a web browser and try a standard http:// Hope it is a linux box and try **telnet host 22** to see if it	If you can connect to something on their box, then it is an issue with their application. Go talk with them. Tell them you can connect to some ports	You cannot connect to anything. Bring this information when you discuss with them.

	responds to ssh	but not the one for this application.	
4	You will run tests under step 4 if you are trying to connect to a computer on your same subnet. These are similar to step 3.		
4.1	Can you ping or connect to a computer located at your table (your switch)?	Step 4.2	Then it is local to your table.
4.2	Can you connect to anything that might be on their box? Use a web browser and try a standard http:// Hope it is a linux box and try **telnet host 22** to see if it responds to ssh	If you can connect to something on their box, then it is an issue with their application. Go talk with them. Tell them you can connect to some ports but not the one for this application.	You cannot connect to anything. Bring this information when you discuss with them.

Client Application Sends a Message But Does Not Get a Response

Here are some suggestions to consider.

1. Make sure you actually have made a network connection (see above)

2. Make sure you check your logs. Maybe they sent back an errant response and your application threw it in the trash.

3. See if it is a timeout issue. Maybe the server application is being run in a debugger because of a code problem and your application is waiting for the developer to finish his testing.

4. Check with the server and see what they have in their logs. Maybe they did not like your input and crashed, broke the connection or just stalled.

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Server Application Cannot Receive Inputs

It is a common event that someone with a server application will tell me that they cannot receive connections from other computers. We will use logic similar to what is described above. Most often, we will discover a software firewall or application failure.

Step	Question	If Yes	If No
1	You already believe your server application is running, but these next steps will help troubleshoot.	Step 2	Uhmm, start your server.
2	Open a terminal emulator. Enter **netstat –a** This will give you a bunch of network stuff and tell you which ports are active on your system for LISTENING. It tells you nothing about which application is listening; only that something is listening on port Z. Do you see something listening on the port you expect?	Step 3	Check your application and configuration
3	From a terminal emulator on the computer with the application: **telnet localhost port** Does this connect to your application? It won't mean anything, but does it connect?	Step 4	Check for a software firewall or configuration issue.
4	From a terminal emulator on a different computer at your table, try the telnet trick from step 3. Does this connect to your application?	Step 5	Check for a software firewall and that you are connected properly to your switch/hub.
5	By this step, you should know that someone at your table can connect to your server application. Can the person trying to connect with their application connect to	They can connect with telnet, but not with their application. This is not a network problem but most likely a configuration issue.	Check for hardware/software firewall at your table. If that is not the problem, Step 6.

	you with the telnet trick?		
6	The client application cannot connect to you. It could be a number of things. Make sure both computers (yours/theirs) can ping your default gateway and each other.		