

Netivus Survey

Start of Block: Informed Consent

Q1

We are interested in understanding problems in enterprise computer networks. You will be presented with a real-world enterprise computer network problem and asked to answer some questions about it.

By clicking the button below, you acknowledge that your participation in the research study is voluntary, you are 18 years of age, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason.

This survey is anonymous. It should take around 15 minutes to complete.

For any questions, a member of the study team is reachable at jseverin@andrew.cmu.edu

- ☐ I consent, begin the study (1)
- ☐ I do not consent, I do not wish to participate (2)

Skip To: End of Survey If We are interested in understanding problems in enterprise computer networks. You will be present... = I do not consent, I do not wish to participate

End of Block: Informed Consent

Start of Block: Overview of Survey



Q10 This survey consists of three parts:

- Questions about computer networking experience
- Categorization of a real-world enterprise networking problem
- Optional:* Evaluate utility of hypothetical network administration tools

This survey should take less than 15 minutes.

You should not reveal any private or personally identifiable information about yourself or others in your answers to any open-ended questions.

JS

Q11

Section 1 of 3

This section consists of some questions about your networking experience.

Q5 Which label characterizes your role in your organization?

- ☐ Network/IT Administrator (1)
 - ☐ Developer (2)
 - ☐ Researcher (3)
 - ☐ Security Analyst (4)
 - ☐ Other (5) _____
-

Q104 How many years of experience do you have in roles that substantially involve computer networks?

- ☐ Less than 1 year (1)
 - ☐ More than 1 year and less than 3 years (2)
 - ☐ More than 3 year and less than 5 years (3)
 - ☐ More than 5 years (4)
-

Display This Question:

If Which label characterizes your role in your organization? = Network/IT Administrator

Q7 How large is your computer network?

- ☐ < 1K Hosts (1)
- ☐ 1K-10K Hosts (2)
- ☐ 10K-100K Hosts (3)
- ☐ >100K Hosts (4)
- ☐ N/A (5)

End of Block: Networking Experience

Start of Block: Problem #1

JS

Q8

Section 2 of 3

In this section, we give a real-world problem from our dataset and apply our categorization scheme. The ultimate goal is to find frequent operational challenges that are not addressed by existing tools. People can then build tools to address these challenges. To this end, we ask for your help categorizing the problem and ask if you know of any tools that could address the issue described in the problem.

Q239

Please click the link below and briefly read the question and answers. Then please return to this page and answer the questions below.

Randomly chooses a NESE post containing a live operational problem, such as:

JS

Q195

<https://networkengineering.stackexchange.com/questions/35320/how-did-i-break-half-of-my-network>

Q193 If you faced this problem in your computer network, what would you search in a search engine (e.g., Google) to diagnose it?

Q106

We want to classify this problem into a few different categories. It is typically unclear which category these problems fall into, which is why we are categorizing them using a survey. **In other words, the corresponding category is a judgment call and there is no right answer.**

There are three different dimensions along which to categorize this problem:



Q190

Dimension #1: Problem Symptom

What disruption does the problem cause in the network from the point of view of the user?

In your opinion, how likely is this the problem symptom?

| | Not at all (1) | A little bit (2) | Somewhat (3) | Very (4) | Completely (5) |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Connectivity - Problem prevents connectivity between endpoints (includes intermittent issues, such as availability) (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Performance - Problem causes performance degradation (e.g., latency, throughput, etc.) (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Other - Please specify (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |



Q188

Dimension #2: Problem Root Cause

What is the underlying reason for the problem?

In your opinion, how likely is this the problem root cause?

| | Not at all (1) | A little bit (2) | Somewhat (3) | Very (4) | Completely (5) |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Lack of Hardware Redundancy - No redundancy in the case of physical device or cable failure (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Bug - Either hardware or software (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Misconfiguration - Misconfiguration in either hardware or software (e.g., DDoS mitigation capabilities are misconfigured, such as by being disabled) (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Missing Feature - Needed capabilities are missing from the network (e.g., DDoS mitigation capabilities are not present) (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| External - Configuration changes were made to something external to the enterprise network (e.g., upstream network changes BGP) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

settings) (5)

Unknown - The
root cause of the
problem is
unknown (6)

Other - Please
specify (7)

☐☐☐☐☐☐☐☐☐☐

Q191

Dimension #3: Problem Trigger

What temporally triggered the disruption to the network?

For instance, there could be a configuration error in the standby router, which only had the chance to effect the network because the primary router had a hardware failure.

In your opinion, how likely is this the problem trigger?

| | Not at all (1) | A little bit (2) | Somewhat (3) | Very (4) | Completely (5) |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Hardware Failure - Physical device or cable failure (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Internal Configuration Change - Configuration change made to some part of the enterprise network (including switches, routers, hosts, gateways, etc.) (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| External Configuration Change - Configuration changes made to something external to the enterprise network (e.g., upstream network changes BGP settings) (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | | | | | |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Software Upgrade - Software on the local enterprise network is updated (e.g., switch software updated, end host software updated) (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Attack Occurred - Malicious attacker launches attack on system (e.g., DDoS) (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Workload- The workload caused the problem to manifest (6) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Unknown - It's unknown what triggered the problem, it just started happening seemingly randomly. Network Engineering Stack Exchange questions often do not include sufficient detail to determine the temporal trigger. (7) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Other - Please specify (8) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q20 Do you know of a tool that would have identified this problem **before** it impacted network operation?

☐ No (2)

☐ Yes (4)

Display This Question:

*If Do you know of a tool that would have identified this problem before it impacted network operation?
= Yes*

Q21 If applicable, please write the name of the tool(s) here.

Q116 Do you know of a tool that would have helped diagnose this problem **after** it had impacted network operation?

☐ No (2)

☐ Yes (4)

Display This Question:

If Do you know of a tool that would have helped diagnose this problem after it had impacted network... = Yes

Q117 If applicable, please write the name of the tool(s) here.

Q240 What are three keywords that you would use to classify this problem? (Please list them below)

Q194 In a few words, what do you think is the main pain-point in this problem?

End of Block: Problem #1

Start of Block: Potential Tools for Problem #1

Q241

Section 3 of 3

Potential Solutions

This section introduces three possible network administration tools and asks you to evaluate how helpful these could be with the previously described problem. (The described tools might be impossible to build; just pretend that they are possible)

Note: This section is *optional*. To end the survey, select "end survey" at bottom of page and press the forward page button.

Q72 Potential Tool 1: Network Testing and Emulation

This potential tool creates a high-fidelity emulated version of the network, including, but not limited to, the end-hosts, routers/switches, and middleboxes. Changes to the physical network can then first be made to the emulated network, where it can be checked if the changes cause unexpected negative impacts to network operation. If no network problems occur in the emulated network over a sufficiently long period of time, then these changes are safe to be made to the physical network.

Q75 How helpful would the "Network Testing and Emulation" tool be for this problem?

- ☐ Not at all (1)
 - ☐ A little bit (2)
 - ☐ Somewhat (3)
 - ☐ Very (4)
 - ☐ Completely (5)
-

Q73 Potential Tool 2: Automated Parameter Setting

This potential tool takes a description of the computer network topology and the network device configuration files and uses a model to modify the configurations for improved performance. Assume that the model is trained in such a way as to learn all the ways that the configurations can interact.

Q76 How helpful would the "Machine Learning for Parameter Setting" tool be for this problem?

- ☐ Not at all (1)
 - ☐ A little bit (2)
 - ☐ Somewhat (3)
 - ☐ Very (4)
 - ☐ Completely (5)
-

Q71 Potential Tool 3: Network Debloating

This potential tool identifies and disables excess features and protocols that are enabled within the network. The excess features and protocols can be identified by observing network behavior over a sufficiently long period of time and comparing the observed capabilities with those that

are enabled in the configuration files. Disabling the excess features can help reduce protocol/feature interaction.

Q74 How helpful would the "Network Debloating" tool be for this problem?

- ☐ Not at all (1)
 - ☐ A little bit (2)
 - ☐ Somewhat (3)
 - ☐ Very (4)
 - ☐ Completely (5)
-

Q192 (Optional) What would be the ideal tool to solve this network problem?

Q181 **Thanks for taking our survey!**

If you want to help us by categorizing another question, please select the appropriate choice below.

- ☐ End Survey (1)
- ☐ Categorize Another Network Problem (2)