Root Cause Analysis: Upper Campus Printer Interruption

Prepared by: Glen Johnson, OIT Network Operations

BACKGROUND

In order to simplify the firewall at UAF, an implementation plan was created, campus personnel notified of scheduled work (see Appendix A), and finally work was undertaken during the morning hours of Sunday, February 18th, 2007. This simplification work was necessary in order to improve OIT Networking's ability to quickly and accurately respond to customer complaints and requests for new service. It had the added benefit of lessening the likelihood that future work would inadvertently disrupt service.

As a part of this work, the Network Specialists in charge elected to improve their safety margin. To do this, they piped a LAN segment to the central switch. There were two reasons for this: (a) ensure they only did one operation at a time, thereby decreasing the likelihood of failure and (b) reduce the troubleshooting time necessary if any one part of the scheduled work were to fail.

While executing this safety improvement, the specialists discovered it already existed on the central switch. After some investigation, It turned out the LAN segment had been deprogrammed from the core router, but not the switch. In order to ensure concise and professional network deployment the specialists deprogrammed the LAN segment from the switch where it was still configured but no longer needed. Normally this work would have occurred when the LAN segment was initially deprogrammed on the router. However, OIT Network Operations is still in the process of regrooming UAF equipment.

While removing this old LAN segment, the LAN segment supporting printers was also, accidentally, removed. This accident was in part due to the immediate nature of the work, and in part due to the lack of regular maintenance (as mentioned) undertaken before the merge by DC&C.

Since the ability to monitor all configured LAN segments, in a way that would have flagged this problem, does not currently exist- this problem went unnoticed until Monday morning.

STATEMENT OF PROBLEM

Many (all?) computers in the Natural Science Facility were unable to print.

PROBLEM TIME-LINE

Sunday, February 18th, 2007

11:05am – Trunk change between central switch and upper campus switch.

Monday, February 19th, 2007

8:30am(approx) – Bill Witte, NSF Dist Tech, called Earl Voorhis, OIT Network Operations, directly and reported a problem affecting all lab computer's ability to print. Earl informed Glen Johnson, OIT Network Operations. Glen began working the problem.

PROBLEM TIME-LINE, CONT.

Monday, February 19th, 2007, cont.

8:36am – Mary Parsons called to report that she was unable to print to network printers because the IP addresses had been changed. This was recorded in CALL198806 and subsequently rolled into a problem ticket, IM38608. In part due to the helpdesk operator for not asking the appropriate questions the ticket was mistakenly classified with the lowest severity rating, the lowest priority, and sent to the wrong group (OIT Desktop Support).

9:25am – Mary Parsons, customer, sent email to Steve Smith, CITO, requesting an escalation of the issue – bypassing established escalation procedure.

9:32am – Richard Kozinski, OIT Desktop Support, began working the ticket.

9:36am – Glen discovered problem and corrected.

9:37am – Richard Kozinski updated ticket to say he spoke with Bill Witte, who noted "there was a network glitch that did not roll vlans. And that he was going to talk to Network to see where this was at." He also noted that printers were now able to print in NSF.

10:01am – Mike Simmons, OIT Desktop Support, closed the ticket: "Worked with Network Operations to correct the network problem that was preventing printing. All systems are functional now."

TIME-LINE NOTES

Bill Witte broke established OIT procedure by calling Earl Voorhis directly, as did Earl for not reporting it to the helpdesk. All problems are intentionally routed through the helpdesk, initially, in order to prevent just the sort of problem that occurred Monday morning. Had helpdesk operators been aware of the multiple user impact nature of this problem, the severity, priority, and assignment of this issue would have immediately changed. It is likely that Mary would have been updated much sooner regarding the nature of the problem.

When Mary Parsons called the helpdesk, she was likely thinking about the last time her printers had failed, back in May-03-2006, as noted in problem ticket IM30772. During the resolution of this problem, it was discovered that due to the way printers were configured on the network, the ip-address of each printer would randomly change. Networking and whoever had configured the printer to begin with (the distributed tech at NSF?) all had a hand in this problem. (1) Networking (DC&C) did not properly document how printers received DHCP addresses. And (2) the person (or persons) who configured the printers and computers, that were attempting to print, did not use DNS addresses (the only stable way of connecting to a printer, due to the way DC&C had configured DHCP).

At 9:37am, when Richard Kozinski reported his conversation with Bill Witte, Bill referenced a conversation with Networking regarding "vlans". He was likely referring to his initial conversation with Earl, regarding work that had occurred on Sunday (as noted in the Background section).

PROBLEM ANALYSIS

During the course of the work, as noted in the Background section, the printer network serving NSF was inadvertently removed from the segment carrying networks to upper campus (ergo, NSF).

SUMMARY

This incident should be considered a rare occurrence. Part of the purpose of the original project, to simply the firewalls, was specifically to address cases like this where work had been previously left unfinished thereby posing a threat to network stability.

A number of other such projects are currently underway (some have already been completed) in OIT Networking, but are taken as slowly and methodically as possible in order to reduce (eliminate if possible) impact to the UAF campus.

While much of the work undertaken Sunday could have been done during business hours, the decision was made to schedule an outage in order to increase the safety margin. The possible impacts of this work were known well ahead of time. Accurate reporting of problems via the established communications channels through the Service Center is crucial to ensure prompt, reasonable service.

APPENDIX A

----- Original Message -----
From: "OIT Support Center" <helpdesk@alaska.edu>
To: <ua-net@email.alaska.edu>; <outage-l@lists.uaf.edu>; <tech-l@lists.uaf.edu>; <sdcritical@email.alaska.edu>
Sent: Thursday, February 15, 2007 3:51 PM
Subject: [Outage-L] OUTAGE: UAF Staff firewall - Sunday, 2007-02-18, 08:30am, AKST

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ACTIVITY TYPE: OUTAGE

SUBJECT: UAF Staff firewall

SCOPE: UAF Staff and Faculty Domains

STATUS 1: Maintenance

START TIME: Sunday, 2007-02-18, 08:30 am, AKST

RECOVERY TIME: Sunday, 2007-02-18, 12:00 noon, AKST

DURATION: 3.5

DESCRIPTION: Update software configuration.

AFFECTED CUSTOMERS: Network traffic to and from: UAF Staff and Faculty
networks

AUTHORIZED BY: Mike Brase OIT Network Operations Manager

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If you have any questions please contact:
OIT Support Center:
Phone: 450-8300
Toll Free: 1-800-478-8226
Email: helpdesk@alaska.edu

or (Available 24 hours a day)
OIT Data Operations Center
Phone: 450-8370
Toll Free: 1-800-910-9650

For more outages go to: http://www.alaska.edu/oit/sc/outage/
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