Root Cause Analysis

Event: DHCP failure on September 21, 2009

Summary: On September 21, 2009, Network Operations received multiple calls about host unable to access the network. It was determined that DHCP address offers were not reaching the hosts due to a previous configuration change which was left untested. Populating the static route table of the DHCP server restored service to normal operations.

Detail:

Prior to the outage, On August 24, 2009, a deficiency was found regarding the static routes configured on the DHCP server in question. At that time, following Redhat documentation, the static route configuration was added to the server. The network service could not be restarted at that time as it would have resulted in an outage, so the routes were added as described in the Redhat document. Due to the proximity of the beginning of the semester the configuration change was not tested as it would have caused an outage and we had been requested to not perform activities that cause service outages during that time.

On Sunday, September 20, 2009 the DHCP server in question was relocated as part of a larger move. The server was powered on and processes including the DHCP daemon were checked for operability. At that time, the staff on hand issued an activity update stating a successful completion without anomaly, which was later found to be inaccurate.

On Monday, September 21, 2009, shortly after 0800, Network Operation began receiving calls regarding hosts that were unable to communicate on the network. Basic troubleshooting ensued, which included checking reach-ability to the DHCP server and functionality of software components, focusing on the DHCP daemon. All of which were successful. The DHCP process was functioning correctly, and appeared to be processing DHCP requests correctly. Upon further examination of the DHCP process logs, it was found that while hosts were able to reach the server to make DHCP requests, and the server was successfully offering DHCP assignments, the hosts were not confirming the assignment. This led to the examination of the static route table on the host, which was found to be empty. For an unknown reason, and without causing a noticeable error condition, the method to install the static routes suggested by Redhat failed, preventing the DHCP offers from reaching the hosts. Since the hosts didn't receive the DHCP offers, once their leases expired early Monday morning they no longer had a correct IP stack configuration and were unable to communicate on the network.

Action Taken: The static route table was repopulated using the manual method described in the Redhat documentation. The server was then rebooted and normal service was restored.
**Future Prevention:** Had we had tested the August 24 changes during a scheduled activity in reasonable proximity to the change, I'm confident we would have been able to identify the problem and prevent the outage on September 21. However, due to the 4 week lapse between the required change and the server relocation, the change had been overlooked by the validation team. To remedy this in the future, only critical changes will be allowed during critical times of the year. Furthermore, all changes will be fully tested at the earliest possible opportunity, regardless of the timing.