UCDAVIS
UNIVERSITY OF CALIFORNIA

Automated Notification System
Network Validation Test
February 2008

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1. Background

Currently UCD has uploaded data records into the WARN automated notification system. These records include primary work phone numbers, primary email addresses and primary cell phone numbers for faculty and staff on campus and at the med center. This information has been uploaded from the On-line Directory. A future phase of the implementation will involve adding personal contact devices for faculty and staff and the inclusion of student contact information.

The network validation test is a performance test that will be focused on validating performance characteristics of the UCD and UCDHS voice and data networks when subjected to models and scenarios anticipated when emergency notifications are added to the daily traffic.

The Test Team has identified a major constraint with the voice mail system and as a result, the voice mail will not be included as part of this test. Instead a broadcast voice mail will be sent to all campus and med center recipients as a "fire and forget" which will not require a response.

The Test Team will determine whether the systems are found to perform within acceptable standards of operation, in compliance with all published and implied performance specifications, and will make recommendations, if necessary, to the campus leadership for practical application.

NOTE: At any point during the test if anyone on the Test Team is contacted by the media please immediately contact Babette Schmidt immediately at (babette@ucdavis.edu; 530-754-6373) or Bill Buchanan (wrbuchanan@ucdavis.edu, 530-754-5466) and they will coordinate with University Communications.

2. Goals

The goals of this test are to:

- Validate the assumption that the campus and med center voice and data networks will deliver the WARN notification messages in a timely manner.
- Ensure that current network services are not degraded by implementation of the WARN system.
- Gather data on the responses from the WARN system real-time reports in an effort to better understand the end-user experience and preferred methods of receiving notifications.
- Make recommendations to the University, if necessary, regarding any voice or data network systems that require additional hardware, firmware, or software modifications or upgrades, or any other modifications to create a more robust network that would support the additional emergency in-coming notifications.
- Document delivery methods and times in an effort to better understand the most effective method to notify campus and med center constituents.

- Measure the response from the students to the campus email notifications which will tell us how effective campus email is in contacting students in an emergency and how quickly they will be notified.

3. Methodology

The Test Team will identify all network equipment that will be affected and determine current capacity levels for each. These thresholds will be used in determining how many messages will be sent to a moderate number of recipients that fall below the known capacity level.

It is understood that a short coming of this test will be the lack of the "emergency situation" during the test, in other words; people are expected to respond differently in a real emergency than in a test environment. For example, the Test Team is aware that there would be several more out-bound and in-coming calls in a real emergency. There would also be the expectation that people would respond more readily to an emergency message than to a test message resulting in a "take rate" that may be lower in a test situation.

a. Requirements

The validation test will focus on:

- Capability of the SL-100 telephone switch to receive and route a large number of telephone calls in a short time period.
- Capability of the campus central email SMTP systems to process and route a large number of inbound and outbound email messages between an off-campus location and the campus network in a short time period.
- Capability of campus email delivery services to process and deliver a large number of email messages in a short period of time.
- Ability to receive extreme number of cell phone calls.
- The Test Team has decided that the voice mail (Octel) system is vulnerable in this scenario for campus and med center and it would be in the best interest of the notifications if the emergency message was sent via broadcast voicemail. This would be considered a "fire and forget" notification and would not require a response.

Note: There are numerous campus email systems. IET runs some and departments run some. The central campus email services run by IET include two pools of SMTP servers (one for routing mail from off-campus senders and the other for routing mail from on-campus senders) and 11 delivery hosts (Cyrus servers). Both SMTP pools and all delivery hosts will be affected. Other campus email services will also be affected (including the campus Xeda service) depending on the number of users who receive communications whose account resides on the servers and the configuration of client software.

b. Objectives

i. Test Objectives

- Determine the hierarchy of devices by small sampling of notifications and responses.
- Verify distribution of results from the first test.

ii. Performance Objectives

- Verify system performance meets requirements.
- Analyze network performance.
    - Test for a sample number of users in various scenarios
    - Test for varying combinations of notifications

c. Planning and Analysis

The network validation test will ensure the following:

- Technology (to verify that data is being moved properly)
- End-user (how are people receiving their notifications)
- Capacity (verify that messages are sent without crashing systems)
- Equipment Monitoring (document load and capacity on pertinent equipment).

Test scenarios:

- Gather realistic data – contact data from White Pages
- Testable requirements:
- Simulate the real world usage by using functional scenarios
- Monitor real time reports
- Enforce changes in a test environment
- Rule out own errors before raising a defect
- Analyze test results.

Current contact information stored:

- Primary Phone Number
- Primary Cell Phone Number
- Primary email Address

d. Test Message

The goal of the test message is to be clearly identified as a test only situation and not cause undo alarm or stress to the campus community. Therefore, each test will begin with a clear statement that there is no real emergency.

For best delivery times, the test message will be approximately 20 seconds in length and under 160 characters (to comply with text messaging standards).

An example of a test message would be, “This is a test of the UC Davis Emergency Alert system. There is NO emergency at this time, this is only a test. Please press 1 to indicate that you have received this message.”

e. Network Stress Mitigation

Precautions have been taken to not over-stress the campus and med center voice and data networks while still testing the boundaries of the notification capabilities without causing service degradation.

The following precautions have been accepted as the mitigation strategies:

- Maintain constant communication to all campus and med center technical personnel while the test is being conducted to identify network stress as soon as possible
- Maintain constant communication with WARN representative so that in the event of network overload the test can be terminated immediately
- Notify local carriers of the test timeframes and parameters so they can monitor their network capacities
- Identify peak traffic hours and run test outside heavy congestion times
- Alert campus and med center community that a test is being conducted
- Establish lines of communication between IT, media and University Communications
- Identify decision makers in each technical area
- Establish a go/no go decision point before proceeding to next phase of test
- The campus Emergency Manager will open the EOC during the test
- Identify escalation contacts
- Identify a test monitor to coordinate with all groups during test
- Inform Help Desk staff about the test details
- Distribute contact list to key test personnel.

f. Test Schedule

- Begin sending messages and monitoring equipment capacity in the morning on February 27, 2008.
- Testing ends on February 28, 2008.
- Test participant survey sent on February 29, 2008.

g. Test Data

Currently, contact devices from the on-line directory are loaded into WARN and refreshed nightly. A snap shot will be taken of the data set and manipulated to fit the parameters of the various test. Below is an approximation of the devices in WARN:

- 10,696 distinct phone numbers (land lines)
- 535 distinct mobile phones (also used for SMS)
- 1,500 distinct pagers
- 30,647 distinct email addresses

Only a small sampling of the contacts loaded into WARN will be used for this test.

h. Test Rates

i. SMS Messages

SMS: Guarantee of 40 per second from aggregator, expected delivery of around 50 per second from the aggregator. WARN has recently measured ~125 per second.

Currently there are approx 360 cell phones with SMS capabilities loaded into the WARN system for campus and 160 for the med center.

A potential issue has been identified in that when a SMS text message asks for a response, the instructions are not clear. The test team has decided to test this feature regardless and document the results to learn more about the end user's intuitive capabilities to respond to the message and to document the delivery times.

ii. Phone Calls

Phone calls will be sent at a rate of up to100 simultaneous calls to campus and med center.

The phone number (530) 752-0047 has been assigned for this test and will be used as the initiating phone number (to ensure that the call looks like it is coming from legitimate UC Davis phone number for those that have caller ID).

The Interalia system will be used in conjunction with the 752-0047 number so that if test recipients are curious about the phone number from the in-coming call and want to re-dial the phone number, the call will be routed to a message that states that the call was part of the emergency notification test. A voice mail box will not be available for people to leave a message.

The length of voice message will be approximately 20 seconds (allowing 5 to 8 seconds on either end to complete the connection).

iii. Voice Mail

No calls will be sent to the Octel voice mail system. If the phone call is not answered, the WARN system will disengage the line and NOT leave a voice mail.

A broad cast voice message will NOT be sent to campus phone numbers. This notification is not expected to be very effective method to notify people since the broadcast message will not activate the message-waiting light.

At a later date, the Test Team recommends testing and documenting the broadcast capabilities and keeping that notification as a method reserved for University Communications. When a broadcast message is sent, no response will not be requested and these messages will be considered a "fire and forget" method of notification.

i. Test Schedule and Procedures

The IET virtual DOC (Department Operating Center) will be activated and all test participants are invited to call into the conference bridge at (866) 205-5235 access code 9864532# during the test.

A web conference has been established so that the test team can log in and see the WARN real-time reports for delivery. The dates and times are below:

Feb 27th: 8am-5pm
https://breeze.ucdavis.edu/r85236325/

Feb 28th: 8am-5pm
https://breeze.ucdavis.edu/r89896791/

Please see page 16 and 17 for a complete list of technicians and decision makers for the day of the test.

A test monitor will maintain the conference bridge throughout the day and be available for updates as people call in for status. The test monitor will also document test results, issues and/or concerns that are identified and be responsible to obtain the go / no go from the technical decision makers, or to escalate as necessary.

A graduated test will be conducted over a one to two day period in the following manner so as not to overload the networks:

i. February 27 8:30 AM – Test 1a

A small number of notifications (approx 200 for campus and 95 for med center) will be sent to a random sampling of recipients that have all devices. This test will send messages out to *all* devices simultaneously and the recipients will be asked to respond to the first message that they receive to establish a hierocracy of devices. Once the technical group has reviewed the data, a go/ no go decision will be made by the test team.

ii. February 27 9:30 AM – Test 1b

A small number of notifications (approx 200 for campus and 95 for med center) will be sent to another random sampling of recipients that have multiple devices with the same instructions as the first test (to respond to the message they receive first).

In Test 1b messages will be sent out to the devices following the hierarchy established in Test 1a so that for a given individual, a second device is not contacted if a response is received before the next device is triggered.

A comparison of device-specific response rates and times between Test 1a and 1b should validate the hierarchy. The network equipment will be monitored for capacity. Once the technical group has reviewed the data, a go/ no go decision will be made by the test team.

iii. February 27 12:00 PM – Test 2

A large number of notifications (approximately 1,000 for campus and 1,000 for med center) will be sent to the networks in the order of the hierocracy that was established in the previous tests to add a slight stress to the networks. In an attempt to contact each person once, messages will be sent out to the devices following the hierarchy established in Test 1a so that for a given individual, a second device is not contacted if a response is received before the next device is triggered.

The outcome of this test will be to monitor network equipment for capacity and delivery times. This test will also validate the broadcast message and the recipient department being used as a fax number. Once the technical group has reviewed the data, a go/ no go decision will be made by the test team.

The campus emails will be distributed to further test load balancing as follows:

300 users on ad3.ucdavis.edu
700 users to ms2.ucdavis.edu

iv. February 27 4:00 PM – Test 3

A larger number of notifications (5,000 for campus and 5,000 for med center) will be sent for increased stress on the networks while still staying below the established thresholds determined by the voice and data technicians. At this point the messages will be mostly voice and email and the network equipment will be monitored for capacity benchmarks and rate of delivery (from WARN and to the recipients).

Again, in keeping with the goals of this test, messages will be sent out to the devices following the hierarchy established in Test 1a so that for a given individual, a second device is not contacted if a response is received before the next device is triggered.

v. February 28 8:30 AM – Test 4

A small random sampling (approximately 500) of students will be sent an email notification. The goal of this test will be to determine how effective campus email is in contacting students during an emergency and to note delivery times. Students that are also employees (this includes interns) will be included in the previous random samplings for tests. It may be useful to note which emails are forwarded to other email addresses such as Google or Yahoo.

Note: A small group of interested participants will be notified in a separate test to give the recipients the benefit of the end user experience. This group is systematically different from the other test groups so the results will not be combined with the rest of the sample for establishing the hierarchy. This group will include concerned participants such as IET leadership, NIT members, campus leadership, etc. as identified. This group will consist of no more than 50 members.

This well-informed, interested group test data could be used to motivate a campus awareness program. This test will also provide data for the benefit of individuals on campus that are contacted through all available devices, by-passing the established device and lag-time hierarchy in a real emergency.

vi. Detailed Notification Breakdown by Network

Goal: Notify each person ONCE.

Order to notify	7	8	6	1			2	3	4	5
	Campus			**Fire & Forget**					**Other Networks**	
	Work Phone	Work Email	Fax	Broadcast Msg	Voice Mail		SMS	Cell Phone	Pager	Personal Email
1a	190	190		190	0		190	190	190	190
1b	190	190		190	0		190	190	190	190
2	1,000	1,000	1	1,000	0		154	154		
3	5,000	5,000		5,000	0					
4		500		0	0					
	Med Center			**Fire & Forget**					**Other Networks**	
	Work Phone	Work Email	Fax	Broadcast Msg	Voice Mail		SMS	Cell Phone	Pager	Personal Email
1a	95	95		95	0		95	95	95	95
1b	95	95		95	0		95	95	95	95
2	1,000	1,000		1,000	0		15	15	1,000	
3	5,000	5,000		5,000	0				310	
4		500		0	0					

j. Scenarios

The objective of this network validation test is to ensure that each element of the UCD and UCDHS voice and data network are not over-stressed during the WARN notification process and meets the implied requirements of the university.

Purpose	Action	Expected Results	Pass / Fail
Test data upload	Send contact information to WARN in Excel spreadsheet for upload into the system.	System should receive spreadsheet and reflect UCD contract information.	
Test Messages	Send multiple messages to various call groups.	University recipients should receive numerous contacts on work phones, cell phones, pagers, etc.	
Test Expandable Number of Contacts	Upload 30,000 records and store data in system.	30,000 university records should be displayed in system.	
Test Delivery Methods	Send messages to various devices.	Messages should be received in all devices across multiple platforms.	
Test Polls	Send message and request a response.	The system should produce real-time reports that reflect recipient input.	
Test Real Time Reports	View Real-time Reports	Reports should reflect responses from recipients with no time delay.	
Test Historical Reports	View Historical Reports	Reports should capture history of calls completed and not completed (i.e. busy, no answer, etc.).	

User Scenarios	Results	Time Delay
Test 1a) Time between message going out and messages received		

Test 1a) Messages responded to		
Test 1b) Time between message going out and messages received		
Test 1b) Messages responded to		
Test 2) Time between message going out and messages received		
Test 2) Messages responded to		
Test 2) Time between message going out and messages received		
Test 2) Messages responded to		
Test 3) Time between message going out and messages received		
Test 3) Messages responded to		
Test 4) Time between message going out and messages received		
Test 4) Messages responded to		
Selected Test Group) Time between message going out and messages received		
Selected Test Group) Messages responded to		

k. Network Validation Test Team and Contributors

During the system test, errors, comments will be recorded. The Network Validation Test Team will meet after the test to review and analyze the results. The Test Team consists of the following representatives:

Campus

**Mark Redican - IET	752 9500
**Mark Stinson- IET	752 7947
*Chris Adams- IET	752-0042
*Jatinder Singh- IET	754-8213
Alex Alfieri- IET	754 6070
Beth Dawson - IET	754 5678
Curtis Bray- IET	754 6199
Dana Drennan- IET	752 0235
Dominic Dolar - IET	752 3456
John Dale – graduate student	(310) 909-8500
Josh Van Horn- IET	754 6699
Laine Keneller- IET	754-4187
Paul Singh- IET	752 8809
Valerie Lucus – Emergency Manager	979 0193

Med Center

** Craig Solenberger - Telecom	(916) 734 7007
**Sheila Green - IT	(916) 734 4510
*Gordon Lau - IT	(916) 734 7951
*Jim Fralick	(916) 734-3399
Amy Yee -Telecom	(916) 734 8000
Glynis Foulk– Emergency Manager	(916) 997-3497
John Raygoza - Telecom	(916) 734 0010

* Decision maker

** Escalation point

Campus Contributors and Executive Oversight

Amy Slavich - IET	
Andrew Majewski – EH&S	
Andy Lamb	
Babette Schmidt - IET	754 6373
Barbara Brady	
Bruce Hupe - Offices of the CHANCELLOR and PROVOST	
Clelia Baur – Communication Consultant	
Dave Klem- IET	752 7552
Dave Shelby- IET	752 4998
David C. Wong- IET	752 0014
Debbie Lauriano- IET	754 5990
Deborah Luthi	
Dennis Minh Ngo- IET	754 5478
Donna Olsson -	
Elizabeth Meyer	
Elliot Lopez	
Frank Wada - Registrar	752 3619
Hampton Sublet - IET	
Jaspreet Gill – Student	
Jill Blackwelder – Safety Services	752 2599
John Pike – Police Dept	
Joyce Souza – Police Dept	
Julie Ann Easley – University Communications	219-4545
Julie McCall - IET	754 6410
Karen Williams – Facilities, Operations and Maintenance	754 7773
Katherine Masyn, Ph.D. - Professor	752 7069
Linda Bisson	
Molly Theodossy	
Morna Mellor - IET	752 5127
Padee Vue – Safety Services	
Pete Siegel – IET	
Peter Brinckerhoff - IET	754 6190
Safa Hussain - IET	
Thomas Beamish	
Zack O'Donnell - IET	

Carriers

AT&T – Robyn	(916) 471-8173
Sprint	
American Messaging – Dan Small	415-516-9916

Vendor
WARN – Josh Evans (760) 840-0492
Bobby Boggess

l. Technician Test Schedule

		Technician	Contact	Decision Maker	Contact	Go/No Go
UCD						
	Email Routing					
	Test 1a					
	Test 1b					
	Test 2					
	Test 3					
	Test 4					
	Telephone Network					
	Test 1a					
	Test 1b					
	Test 2					
	Test 3					
	Test 4					
UCDHS						
	Email Routing					
	Test 1a	Gordon Lau	916-734-7950			
	Test 1b					
	Test 2					
	Test 3					
	Test 4					
	Telephone Network					
	Test 1a	Jim Fralick	916-734-3398			
	Test 1b					
	Test 2					
	Test 3					
	Test 4					

m. After-test Survey

The following is a draft of the survey questions that will be sent to test participants on the day after the test. The results of the survey will help provide additional information and insight regarding the end-user experience and the notifications.

0. What is your campus affiliation? *(check all that apply)*
    a. Faculty
    b. Staff
c. UC Davis campus
d. Sacramento campus

1. Did you receive at least one of the test emergency notifications?
    a. Yes
    b. No (skip to Thank You page)

2. When did you receive the notification(s)?
    a. Wednesday, February 27
    b. Thursday, February 28

3. Next to the notification type(s) you received, please indicate to the best of your recollection the order in which you received them.

	a. A call that I answered with my desk phone at work
	b. A call that I answered on my cell phone
	c. A voicemail message on my work phone
	d. A voice mail message on my cell phone
	e. A text message on my cell phone
	f. A message on my pager
	g. An email message
	h. A fax

4. If you received a test emergency notification on your cell phone, which cellular provider do you use?
    a. AllTel
    b. AT&T
    c. Cellular One
    d. Metro PCS
    e. Sprint/Nextel
    f. T-mobile
    g. TracFone
    h. Verizon
    i. Virgin Mobile
    j. I did not receive a notification on my cell phone
    k. Other (please specify _____)

5. Where were you when you received the test emergency notification?
    a. UC Davis Campus
    b. UC Davis Medical Center
    c. Research Park Building
    d. Chiles Road Building
    e. University Extension
    f. Other Location (please specify)_____
    g. Not sure

6. Did you have any trouble with the emergency notification(s) you received?
    a. Did you have trouble viewing or hearing the notification(s)?
        i. Yes (please explain_____)
        ii. No

    b. Were the instructions easy to follow?
        i. Yes
        ii. No (please explain_____)

    c. Was it clear that the test emergency notification was an official campus message?

i. Yes
ii. No

If not, please tell us what might make this clearer: _____

d. Was there any information missing from the test emergency notification that you would expect to see in this kind of message?
   i. Yes
   ii. No

   If yes, what information was missing?_____

7. Did you respond to the notification?
   a. Yes
   b. No

8. When replying to the notification, did you experience any difficulties?
   a. No, I was able to respond without problem. (skip to question 11)
   b. Yes, I had a technical problem, but was able to resolve it and respond.
   c. Yes, I had a technical problem that prevented me from responding.
   d. Yes, the test period ended before I was able to respond.

9. If you experienced a technical problem when replying to the notification, please tell us what device you were using to reply and briefly describe the problem:
   _____

10. Did you use an assistive device (e.g., screen reader/magnifier, phone amplifier, TTY or TTD) to view, hear or respond to the test emergency notification?
    a. Yes
    b. No

    If so, did this device prevent, delay or otherwise impede the transmission of or response to the test notification?

    Yes

    No

    If so, please describe the device and the problem you experienced:_____

11. Drawing on your experience with this week's test, select your preferred method/device for receiving <u>future</u> official campus emergency notifications:

__Office/desk phone	__Campus email address
__Voice message on cell phone (work)	__Personal email address
__Voice message on cell phone (personal)	__Pager
__Text message on cell phone (work)	__Other_____
__Text message on cell phone (personal)	__No preference

n. Conclusions

<To be inserted after test analysis by test team>

4. Acronyms and Definitions

a. DOC – Department Operating Center
b. IET – Information and Educational Technology department at UC Davis.
c. SMS – Short Message Service. Also known as text messaging.

d. SMTP – Simple Mail Transfer Protocol, used in sending and receiving e-mail.
e. UCD – University of California at Davis
f. UCDHS – University of California at Davis Health System
g. WARN – Wide Area Rapid Notification. Automated notification system used by UC Davis to alert faculty and staff in the event of an emergency.