the Availability Digest

BlackBerry Takes Another Dive
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Déjà vu. It happened again. It was less than a year ago that the BlackBerry email network of RIM (Research in Motion) went down, and it took days to work through the backlog of email that had built up during the half-day outage.[1]

Just last month, email and Internet service again disappeared from the screens of millions of BlackBerrys in North America and Canada. Again, it was over a day before RIM's email service worked off the resulting backlog and returned to normal.

The BlackBerry outage in April of 2007 was caused by a software upgrade that had not been properly tested. RIM management said that this would never happen again. Guess what? The outage in February, 2008, was caused by a software upgrade that had not been properly tested. Will they ever learn?

Research in Motion and the BlackBerry Success Story

BlackBerrys are handheld "smart phones." Not only do they serve as cell phones, but they also send and receive email messages and provide access to the Internet, among other features. They have become a perceived necessity for bankers, lawyers, journalists, lawmakers, business people, and anyone else who feels that he has to be connected while "on the go."

The BlackBerry network was created and is managed by RIM (Research in Motion, of Ontario, Canada). RIM is the developer and owner of the BlackBerry technology, though it perhaps is not the inventor, as evidenced by a patent lawsuit it recently lost. Its email network comprises two Network Operating Centers (NOCs), one in Canada and one in the UK. The Canadian NOC serves subscribers in North America and parts of Asia, and the UK NOC serves subscribers in the UK, Europe, the Middle East, and Asia.
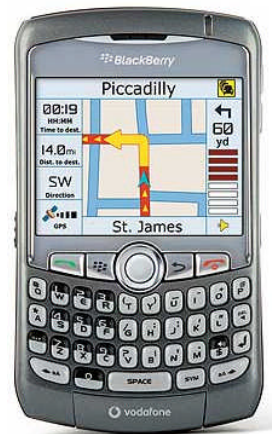
Each NOC acts as a hub, receiving BlackBerry email messages from corporate and ISP email servers, encrypting them, and pushing them to other BlackBerrys over the cellular networks and to other email servers over the Internet. Thus, BlackBerry subscribers can exchange email directly with other BlackBerrys and can send and receive email to and from email servers.

The BlackBerry service has expanded rapidly. The number of BlackBerry users has tripled over the last two years to twelve million subscribers, eight million of whom are in North America.

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[1] BlackBerry Gets Juiced, *Availability Digest*; May, 2007.

Down in April, 2007

Over the years, RIM has had its share of BlackBerry hiccups but nothing terribly serious. All of this changed on Tuesday evening, April 17, 2007. On that day, at 8 pm EDT, BlackBerry messages stopped flowing to subscribers in North America.

By Wednesday morning, the system had been returned to service; but it had to deal with a huge backlog of emails that had accumulated during the outage. These emails started to trickle out Wednesday morning, but new emails that came in entered the end of the queue and were delayed for hours. It was not until Thursday that operations returned to normal.

Once operations normalized, RIM management began to release details of the outage. They reported that the outage was triggered by the "introduction of a new, noncritical system routine" designed to optimize cache performance. They had not expected this change to affect the regular operations of BlackBerry.

However, despite previous testing, the new system routine set off an unexpected chain reaction. It triggered a series of interaction errors between the system's operational database and cache and resulted in a temporary outage until the backup system could be brought online.

After the RIM technicians isolated the database problem and tried unsuccessfully to fix it, they began the failover process to the backup system. But horrors of horrors, the failover attempt failed, despite failover having been previously tested.

Clearly, RIM's testing proved to be insufficient. RIM management stated that it had identified several deficiencies in its testing, monitoring, and recovery processes and promised that these processes would be enhanced to prevent a recurrence of the incident. RIM's co-chief executive officer said that such disruptions were very rare and pledged that the company would prevent such a service failure from happening again.

Down Again in February, 2008

But such a failure did happen again.[2] On Monday, February 11, at 3:30 pm EST, Verizon, Sprint Nextel, and AT&T were notified of a "critical severity outage" in RIM's email and Internet services. About half of all North American users – about four million subscribers – suddenly found their email screens empty.

During the April, 2007, outage, RIM was severely criticized for not informing their subscribers as to what had happened and what the prognosis was. This time, RIM sent out a message to its large clients, saying:

> "This is an emergency notification regarding the current Blackberry infrastructure outage.
>
> BlackBerry subscribers may be unable to send or receive messages. Subscribers may also be unable to register their device, roam in another location, or use other services such as Internet browsing.
>
> BlackBerry Internet Service subscribers may be unable to use the BlackBerry Internet Service web site or perform activities such as creating new accounts, accessing their Internet mailbox, integrating third-party email accounts, or viewing email attachments.
>
> Devices may not receive new service books. BlackBerry Connect and BlackBerry-enabled devices that require a new PIN may be unable to receive the PIN.

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[2] Material for this article was obtained from portfolio.com, Reuters, The Mercury News, zdnet, computerworld.com, bloomberg.com, gizmodo.com, pocket-link.co.uk, and PC World over the period from February 11 to February 14, 2008.

> BlackBerry Enterprise Servers may be unable to connect to the BlackBerry Infrastructure.
>
> Wireless service providers and device resellers may be unable to use BlackBerry administration web sites or perform activities such as creating subscriber accounts or provisioning services for subscribers."

The only problem was that this message was sent out by email! How ironic!

The BlackBerry system was down for three hours. The good news was that voice and SMS (text messaging) services were unaffected. The bad news was that it was not until the next day that the backlog of email messages dissipated and that service returned to normal. The backlog was aggravated by the millions of messages that read something like "Subject: Test. Body: Test Test Test Can you hear me now?"

The Post Mortem

For redundancy purposes, RIM provides to its North American NOC two paths represented by two IP addresses. The email servers of RIM clients are split between these paths.

Early tests seemed to indicate that one of the IP paths was refusing connection requests. It was the RIM clients using that path who experienced the outage. Clients using the working path experienced little or no service interruption.

However, at this time, RIM offered no explanation of what had happened. They only said that it "continues to focus on providing industry-leading reliability in its products and services"

Subsequently, RIM announced that the outage was due to an internal data routing system within the BlackBerry service infrastructure. The routing system had recently been upgraded and had misbehaved. Once again, an upgrade that seems not to have been properly tested took down the BlackBerry system.

RIM went on to say that "the upgrade was part of RIM's routine ongoing efforts to increase overall capacity for longer term growth. RIM continuously increases the capacity of its infrastructure in advance of longer term demand. Similar upgrades have been successfully implemented in the past, but there appears to be a problem with this particular upgrade that caused the intermittent service delays."

Are You a "CrackBerry" Addict?

The addictive nature of BlackBerrys has led them jokingly to be called "CrackBerrys." Are you a CrackBerry? Over a year ago, in December, 2006, after consulting with a time-management expert, professors, and therapists who specialize in family training and obsessive-compulsive disorder, Katherine Rosman came up with the following rules to control your addiction:[3]

1. Don't check email during meals.

2. Don't hide your email habits from your family. If you think someone would be upset to see you BlackBerrying, it's a sign that you probably shouldn't be.

3. Commit to stop emailing while driving, crossing the street, or doing anything that requires careful attention.

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[3] K. Rosman, A 12-Step Program for Addicts, http://executivejournal.com/sidebars/20061212-rosman-sb.html; December 8, 2006.

4. Don't check email for the first hour of the day. This will help you shake the tic-like ritual.

5. Leave your BlackBerry in the car or at home when attending any function taking place at your child's school.

6. Decide on an email-free block of time at home to pay attention to your family.

7. Decide on an email-free block of time at work, and inform your colleagues that your BlackBerry will be turned off during that time.

8. During email-free times, turn off your BlackBerry; and stick it in a drawer.

9. If you are in the middle of a work crisis, consider blocking out a few fifteen-minute periods of time to check email. Turn off your BlackBerry otherwise.

10. When emailing while spending time with your family, decide whether your priority at that time is enjoying your family or getting work done. If the former, turn off your BlackBerry. If the latter, return to the office.

11. Upon arriving at home, light a candle, put on music, pour a drink. Don't check your email during this time.

12. If mobile email creates a tension between you and your significant other, jointly agree on BlackBerry-free zones, such as the bedroom.

Lessons Learned

There are two significant lessons to be learned from this experience.

Upgrades Can Be Hazardous To Your System

Upgrades to applications, operating systems, databases, hardware, networks, or any other component of your system are to be feared. No matter how careful you are, something can (and often will) go wrong.

The first rule, of course, is to thoroughly test the upgrade before installing it. Most of us do that very well. However, what we don't often do is to prepare a contingency plan. What do we do if the upgrade doesn't work or if it causes unanticipated problems? How are we going to undo it?

Oh! If we only had an Undo button, but we don't. If we are concerned about availability, one way to quickly back out an upgrade is to take advantage of our system redundancy which we surely have (don't we?). Run the upgrade in one system and be prepared to immediately switch over to the other system if the upgrade gives a problem.

Even Infrastructure Needs Backups

BlackBerry service is becoming part of the critical infrastructure that many of us depend upon. In many cases we have backups for infrastructure failures. We expect our power to be always available, but we are smart enough to provide UPS backup systems and motor-generators to carry us over in the event of a power outage.

We also expect to get a dial tone whenever we pick up the telephone handset. A couple of decades ago, we had no recourse if the telephone went dead. Fortunately, now we do. It is our cell phone.

Can the Internet go down? Not likely, given its multipath redundancy with automatic rerouting around failures. But it can happen, and it has. In December, 2006, a massive earthquake broke Internet connections between Southeast Asia and the rest of the world. It took over seven weeks to repair the damage. Just last month, in January, 2008, cables connecting the Mideast and India to Europe and the Eastern United States were severed, disrupting Internet service for days.[4] Are you prepared for such a catastrophe? Do you have agreements in place for satellite backup channels?

Now we find that even at the personal level we should have backup contingency plans. What do we do if our BlackBerry suddenly goes dead for hours or days? It is time to think about that and have a contingency plan as to what to do.

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[4] What? No Internet?, *Availability Digest*, February, 2008.