Attachment

Summary of Measures Taken to Prevent Mobile Communications Service Interruptions, Protect Secrecy of Communication and Appropriately Manage Personal Information

NTT docomo

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Index

Introduction

The series of network interruptions from June 2011 to January 2012 was caused primarily by rapid increases in both data traffic and the number of control signals, resulting mainly from the rapid growth of smartphones, which caused malfunctions in the communication equipment used for DOCOMO's "sp-mode" system and packet switching.

DOCOMO extends its deepest apologies to customers for any inconvenience caused by these network interruptions. Going forward, the company will continue to focus on upgrading and strengthening its equipment and related operations.

DOCOMO takes these matters very seriously. On December 25, 2011, the company established the Task Force for Improvement of Network Infrastructure, headed by the president and CEO, to rigorously supervise efforts to realize a high-quality network that offers users safety and peace of mind, and ensures the secrecy of communication and the protection of personal information.

This report reviews the measures that DOCOMO has taken, including full inspection of its networks, in response to administrative guidance.

1. Guidance and Requests Received from Ministry of Internal Affairs and Communications (MIC) and Specific Details Thereof

Guidance and specific requests received from MIC included the following two items:

(1) Guidance issued to NTT DOCOMO, INC. on January 26, 2012 concerning the series of interruptions.

(2) Request for a full inspection of network infrastructure and operations to prevent interruptions in mobile telecommunications, issued on February 22 by an MIC liaison committee on countermeasures against mobile phone communication failures.

Content of guidance:

The following preventive measures, etc. must be taken as a matter of urgency, and actual results and future initiatives must be reported back to the MIC no later than March 30 (Fri.), 2012.

1. Deployment of telecommunications equipment to provide appropriate support for increases in users and traffic, etc.
2. Deployment of appropriate backup equipment and construction of monitoring systems to manage telecommunications equipment failures, etc.
3. Prevention of congestion by means of overload tests, etc.
4. Protection of secrecy of communication and personal information
5. Appropriate support for users

Content of Request from MIC liaison committee on countermeasures against mobile phone communication failures:

To prevent network interruptions, full inspections must be carried out regarding equipment and the organizational framework for maintaining, operating and managing equipment. Results of these inspections must be provided in the report to be submitted in accordance with the guidance.

Inspections should help to prevent:

1. Trouble with redundancies
2. Glitches in design, set-up and deployment of equipment
3. Trouble with software
4. Trouble with power-supply facilities
5. Infections from malicious programs
6. Incorrect construction procedures

2. Preventive Measures for Network Interruptions

2-1. Strengthened Organizational Structure

For the company as a whole to respond to the series of communication malfunctions, DOCOMO established the Task Force for Improvement of Network Infrastructure. Led by the company president, the Task Force evaluated countermeasures to prevent the recurrence of malfunctions. It also established an advancement promotion office, as well as a project team responsible for eliminating human error, and worked to increase the number of IP-related technical experts, etc., to continue strengthening monitoring and measurement systems and ensure accident-free construction work.

Measures Taken by Task Force for Improvement of Network Infrastructure

(Established on Dec. 25, 2011, and met 14 times as of March 31, 2012.)

- Measures to prevent network interruptions and leakage of information.
- Measures to increase network equipment and processing capability, implemented timely and appropriately based on results of network inspections.
- Measures to ensure prompt and appropriate information-sharing with customers.

Strengthened organizational structure based on evaluations by Task Force for Improvement of Network Infrastructure

Established an advancement promotion office

- To oversee sp-mode system validation and processing capacity improvements (Jan. 11, 2012)

Launched a project team responsible for eliminating human error

- To drive initiatives to eradicate human error (Feb. 13, 2012)

Strengthened monitoring and measurement systems

- To enable 24/7 hotline for rapid responses from monitoring, measurement and development units and venders. (Dec. 26, 2011)

Increased number of DOCOMO IP technology experts

- To strengthen the organizational framework for developing, validating, maintaining and managing IP-related technologies by interconnecting with NTT Group companies (Mar. 1, 2012)

2-2. Countermeasures for Network Interruptions

DOCOMO's maintenance and development departments combined to determine the causes of the past interruptions and evaluate countermeasures. The company completed implementation of 16 countermeasures to fix glitches, improve processing capabilities and increase equipment, etc. in response to each condition, spending 3,940 person-days.

Date and Nature of Network Interruption	Details of Countermeasures	Completion Date
June 6, 2011 Difficulties in using voice and packet communication on Xi, FOMA and mova networks	• Corrected program software to prevent congestion in Communication Control Unit • Revised process for Communication Control Unit Standby Facility Switching • Fixed glitch in Communication Control Units for system recovery	• June 12, 2011 • June 12, 2011 • June 12, 2011
August 16, 2011 Difficulties in using packet communication for sp-mode	• Optimized operations (speedy traffic control) • Downsized network authentication server buffer • Enhanced network authentication server • Enhanced facilities for network authentication server and session control server • Improved authentication server processing capabilities	• August 18, 2011 • August 22, 2011 • August 28, 2011 • November 30, 2011 • March 22, 2012
December 20, 2011 Email addresses of a portion of sp-mode users were replaced with email addresses of other persons	• Revised internal processes for user control servers • Rerouted important communication from malfunctioning channels • Management of signal processing confirmation • Reviewed signal processing method to reduce load on sp-mode systems • Expanded buffers of authentication servers	• December 22, 2011 • December 28, 2011 • December 30, 2011 • January 6, 2012 • January 12, 2012
January 1, 2012 Difficulties sending/receiving sp-mode mail ("undeliverable message" notifications not received)	• Re-examined internal processes for mail control servers	• January 3, 2012
January 25, 2012 Difficulties using voice and packet communications on FOMA network	• Inspected packet switching equipment processing capability • Switched to new-version packet switching equipment in consideration of traffic signal volume (see next page for details)	• February 19, 2012 • February 25, 2012
	16 countermeasures	

Reference: Status of Additional Packet-switching Equipment Installations

DOCOMO is installing new-version packet switching equipment, giving priority to areas in which resources are in highest demand. Installation is progressing smoothly.

Installation Date	Covered Area	New-version Equipment Installed	
2012/02/25 Completed	Tokyo's 23 wards, Urayasu and Ichikawa in Chiba Prefecture and part of Kawasaki in Kanagawa Prefecture	2	14
2012/03/03 Completed	Part of Aichi Prefecture, including Nagoya	3	
2012/03/10 Completed	Part of Hyogo Prefecture, including Kobe	1	
2012/03/25 Completed	Tama district of Tokyo, part of Kanagawa Prefecture, part of Saitama Prefecture and all of Yamanashi Prefecture	3	
2012/03/31	Part of Fukuoka, Saga, Kumamoto prefectures, and all of Okinawa prefecture	5	
2012/04	11 areas nationwide	26	
		Total: 40	

2-3. Additional Countermeasures to Prevent Further Interruptions

DOCOMO is implementing 17 countermeasures, including improving processing capabilities and procedures, re-examining construction procedures, etc., to improve network infrastructure for the prevention of interruption recurrences and for accident-free construction, spending 65,640 person-days.

Countermeasures		Details of Countermeasures	Completion Date
Processing Capacity	Packet Switching Equipment	● Packet-switching equipment added based on results of processing-capacity inspections (continuous expansion of equipment due to the increasing number of smartphones) ● Enhanced processing capacity of a new-version packet switching equipment	● 4/2012 ● 8/2012
	sp-mode system	● Introduction of newly developed mail information server ● Improved software and additional network equipment responding to the increasing number of smartphones	● Feb 17, 2012 ● 12/2012
	Traffic Overload	● Rerouted processing away from malfunctioning channels ● Rerouted processing when service control equipment switches to backup equipment	● 4/2012 ● 8/2012
	Increased Control Signals	● Changes in wireless connection procedures to allow the transmission of multiple applications with one wireless connection ➢ Request cooperation of application providers to reduce network load and GSMA activities, etc.	● 12/2012 ➢ Ongoing
Processing Mode		● Change of sp-mode connection procedures (new procedures that do not cause IP address conflicts) ● Change of mopera connection procedures (new procedures that do not cause IP address conflicts) ● Introduction of function to prevent problems with user identification information during processing	● Feb 19, 2012 ● Mar 31, 2012 ● Jan 31, 2012
Quality of Software		● Maintenance of development documents and strengthening of trials	● Mar 23, 2012
Quality of Construction		● Share information within company to increase preparedness for dangerous conditions and create an environment in which such information is continuously collected and acted upon. ● Classify the importance of each construction project by the impact on customers and share this information within the company ● Ensure procedures for maintaining up-to-date documents required for construction ● Ensure procedures for maintaining construction procedures in line with updated documents ● Ensure recovery procedures are in place to handle unforeseen circumstances during construction ● Fix rules on construction time slots depending on the nature of construction to minimize impact on customers.	● Feb 2, 2012 ● Feb 3, 2012 ● Feb 6, 2012 ● Feb 6, 2012 ● Feb 6, 2012 ● Feb 10, 2012
Total		17 countermeasures	

3. Comprehensive Inspection of Equipment and Systems
3-1. Results of Comprehensive Inspections

After the series of network interruptions occurred, the Task Force for Improvement of Network Infrastructure carried out extensive companywide inspections regarding network equipment capacity, equipment processing capabilities, processing procedures, etc.

Based on the request for a full inspection (covering 6 areas) of network infrastructure and operations to prevent disruptions in mobile telecommunications, which was issued on February 22 by an MIC liaison committee on countermeasures against mobile phone communication failures, DOCOMO enhanced its inspection processes via six work groups (listed below). As a result, DOCOMO has confirmed that its communication network can be operated stably. (90,450 person-days)

Full Inspection of Equipment and Systems (6 areas)	Work Group	Inspection Categories	Inspection Items
1. Avoid trouble with redundancy function	Network redundancy inspection work group	23	2,806
2. Confirm design, set-up and deployment of facilities	Facility design inspection work group	17	5,223
3. Avoid trouble with software	Software inspection work group	24	384
4. Avoid trouble with power-supply facilities	Power-supply facility inspection work group	21	25,863
5. Avoiding infections by malicious programs	Network facility security inspection work group	45	585
6. Avoid incorrect construction procedures	Construction procedure inspection work group	15	222,105
Total	-	145	256,966

3-2. Areas that have been strengthened through inspections

Through a series of extensive companywide inspections, DOCOMO was able to improve the speed and accuracy of providing customers with information on network operation status. DOCOMO recognizes the importance of regularly conducting overload tests matched to current traffic conditions.

Category	Inspection Items and Improvements
Confirmed Via Comprehensive Inspection	● Confirm that equipment processing capacity satisfies requirements and that the resource usage rate for commercial systems is within normal ● Confirm that the system constantly monitors equipment and is configured to respond promptly to malfunctions ● Confirm that network equipment has the necessary redundancy and that switching to redundant equipment is possible at all times
Strengthened After Comprehensive Inspection	● Set performance targets for regular overload tests implemented in accordance with current traffic conditions ● Establish construction procedures to minimize impact on customers and consider unforeseen circumstances during construction ● Internally share information on potentially dangerous conditions and create an environment in which such information is continuously collected and acted upon ● Identify construction work that could significantly affect customers and circulate such information internally, and post viewer-friendly maps on the company website to show construction areas where customers are likely to be affected.
Strengthened by Examining Third-party Cases	● Minimize the impact of construction by scheduling work on power-supply facilities during time slots when customers will be affected the least ● Expand the scope of security inspection equipment and add new inspection items to block improper programs

4. Preventive Measures to Protect Secrecy of Communication and Personal Information

The breaches of communication secrecy and leaks of personal information during this incident are attributed to network malfunctions. In view of the effectiveness of strengthening all recurrence-prevention measures and implementing countermeasures specific to this series of malfunctions, DOCOMO will strive to protect communication secrecy and personal information through company-wide initiatives to prevent the recurrence of malfunctions in design, construction and verification processes.

Measures	Details
Preventive Measures	Organizational, operational and facility-based measures to better protect communication confidentiality and personal information ●Educational presentation delivered personally by the president to personnel related to DOCOMO and its group companies ●Solidified common understanding through shared awareness, deployment of various measures and greater visibility of activities (educational posters, slogans, etc.) on a national level aimed at eliminating human error ●Minimize follow-on interruptions by rapidly identifying and responding to anticipated developments, thereby protecting communication security and personal information (confirm best practices for recovery procedures deployed during actual events) ●Revised connection procedures to prevent communication security breeches and personal information leaks, and implemented preventative measures company-wide

In terms of responding to customers, DOCOMO informed customers about the network interruptions by sending them letters of apology and publishing advertisements that conveyed apologies in newspapers, and also by operating a dedicated call center from December 27 to February 29, which responded to 2,749 inquiries from customers.

5. Prompt Provision of Information on Network Status to Customers

As a result of the series of network interruptions last year, DOCOMO, aiming to provide information to customers as quickly as possible, has further enhanced its initial communication of such information internally to ensure companywide understanding, and also has restructured related internal frameworks and customer service procedures.
Additionally, in response to the administrative guidance received by the company, DOCOMO has strengthened measures to provide customers with quick, accurate and user-friendly information regarding network operation status, via announcements through the media, docomo Shops, etc., and mapping construction areas on the “Notice of Construction” page of the company website.

Measure	Details	Implementation
Improved Provision of Information to Customers	Fast website updates Fast provision of information to related organizations and agencies (MIC, media, etc.)	Jan. 27, 2012
	Fast announcement of malfunction status at all docomo Shops	Mar. 5, 2012
	Revised “Notice of Construction” webpage (in Japanese only) to show construction areas via maps	Mar. 10, 2012
Improved Communication of Information to Customer Service Division	Upgraded environment for smoothly dealing with customers via Customer Service Division	Mar. 5, 2012

6. Implementation of Countermeasures and Inspections

In relation to past network interruptions, DOCOMO has completed 16 countermeasures, including rectifying malfunctions, improving processing capabilities, adding equipment, etc., which required 3,940 person-days of input. In addition, the company is still implementing 17 other countermeasures, including improving processing capabilities and procedures, reviewing construction procedures, etc., to improve network infrastructure aimed at preventing malfunction recurrences and achieving accident-free construction, which required 65,640 person-days of input. For comprehensive inspections of equipment capacity, equipment processing capabilities, processing procedures, etc., the Task Force for Improvement of Network Infrastructure established 6 work groups to oversee implementation in 145 categories totaling 256,966 items, which required 90,450 person-days of input.

Category		No. of Measures	Implementation	Implementation
Countermeasures	Measures to resolve past interruptions	16	-	3,940 person-days
	Measures to prevent future interruptions	17	-	65,640 person-days
	Subtotal	33	-	69,580 person-days
Comprehensive Inspections	Comprehensive inspections of equipment and organizational structure	-	145 categories 256,966 items	90,450 person-days
Total		33	256,966 items	160,030 person-days

Conclusion

DOCOMO has implemented 16 countermeasures which required 3,940 person-days regarding past interruptions of its networks, and a further 17 measures which required 65,640 person-days to prevent further network interruptions. Furthermore, in terms of communication network facilities, DOCOMO has conducted a full inspection of 145 categories encompassing 256,966 items, committing 90,450 person-days to the effort.

As a result of extensive companywide measures and inspections, DOCOMO has confirmed that its communication network operates stably. Going forward, the company will continue to strengthen its network infrastructure to support growing smartphone traffic, including countermeasures to handle an increasing volume of control signals.

Further, DOCOMO has improved its procedures for quickly and accurately informing customers about the operational status of its networks. The company has also reviewed its construction plans and procedures, fully taking into account the impact on customers.

DOCOMO extends its deepest apologies to customers for any inconvenience caused by the series of network interruptions. Going forward, the company is committed to continuously strengthening the reliability of its communication networks so that customers may continue to use its services safely and with peace of mind.