

Test-bed Development for Resilient ICT

Hiroshi Kumagai

Resilient ICT Research Center

NICT(National Institute of Information and Communications Technology)

PRAGMA Workshop, 27 January 2016

The raiding Tsunami (Sendai plain)

3:56PM, March 11, 2011

Giant Earthquake + Tsunami + Nuclear plants collapse;

Damage areas:

- ICT Infrastructure destroyed

Wider areas:

- Traffic congestion: x50~60 call attempt than usual
- 80~90%(max) call restriction applied
- 29,000 Mobile base stations shutdown (due most to electric power outage)

⇒ **Need resilient ICT**

To learn the lesson from the Great Earthquake of March 11, 2011

- National project for Resilient ICT organized by MIC;
- Role of NICT
 - ◆ To build a research center as the base station of collaboration among all sector members in the damage area,
 - ◆ To develop the test-bed facilities to support overall project activities,
- 2012.4: NICT Resilient Research Center established;
- 2014.3: Completion of Center building and the Test-bed facilities installed.



▲ Resilient ICT Research Center



▲ Access Point of wireless mesh Network (left); Mobile Earth Station (right)

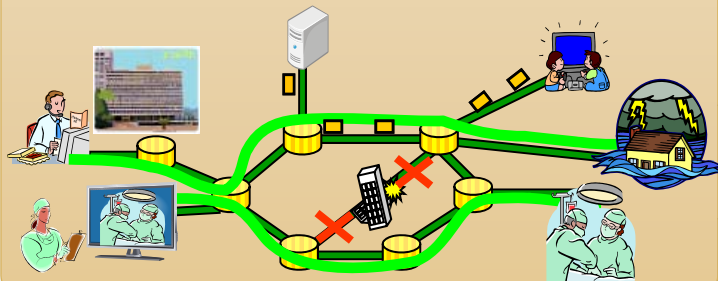


▲ Cluster Server for disaster information processing (left); Packet-Circuit integrated node(right)

Resilient ICT Research Center in NICT

Collaboration among NICT, Tohoku Univ. and Industries

① Robust Photonic Network Platform

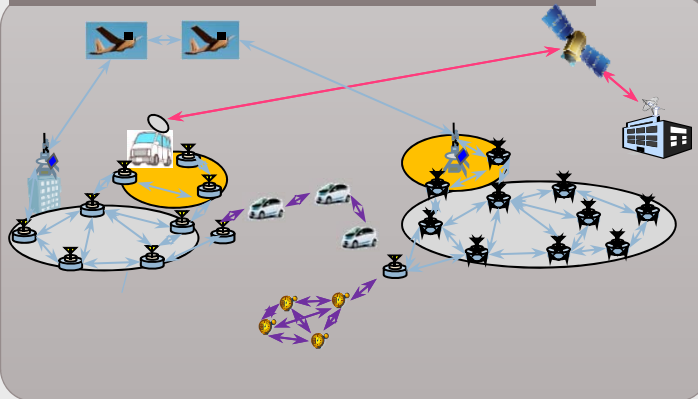


Resilient ICT Research
Center @Sendai

Universities
and
Industries

Test Bed System

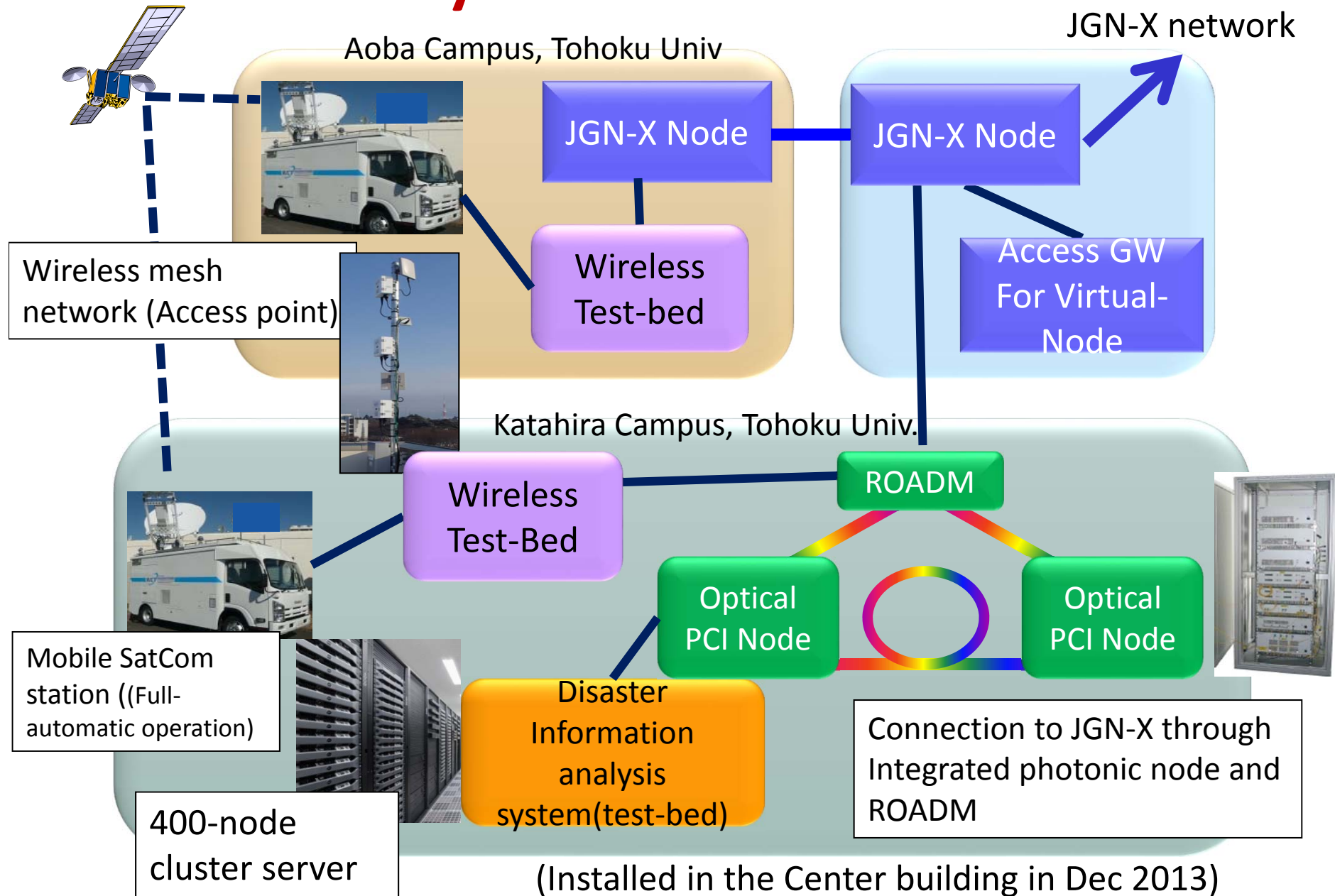
② Dependable Wireless & Satellite Network



③ Disaster Information Distribution Platform



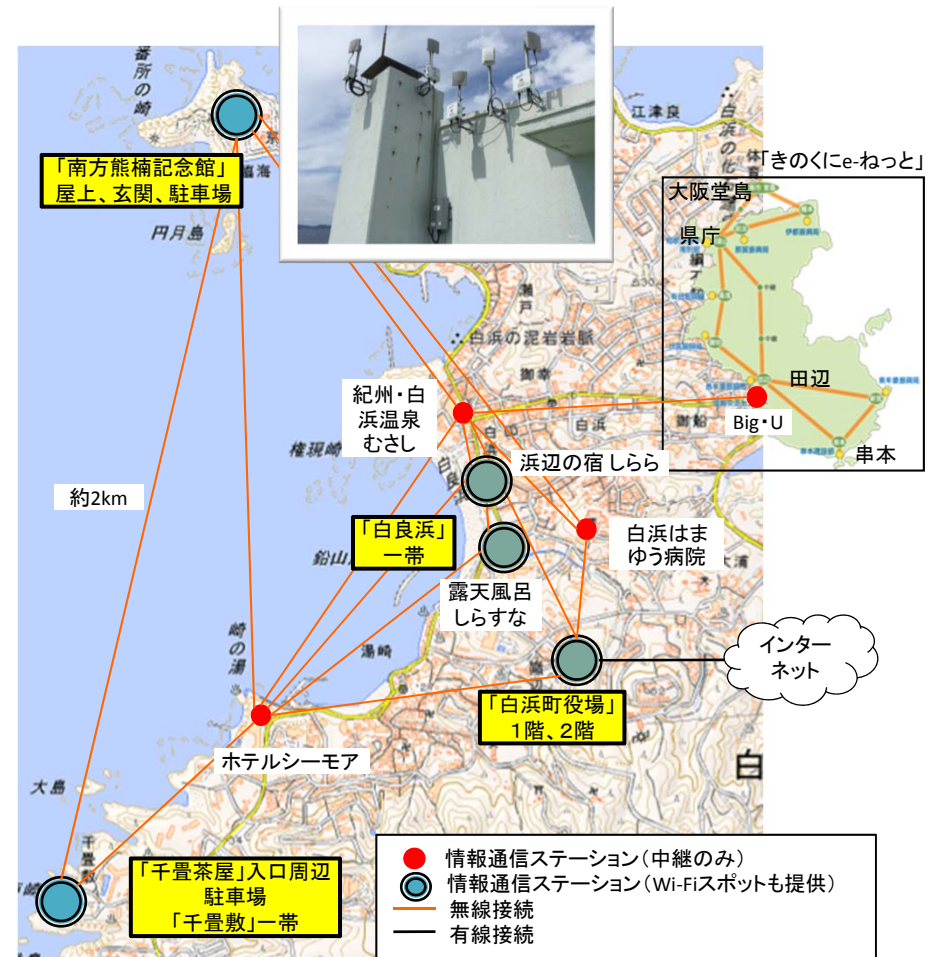
Test-Bed facility for resilient ICT research



Field experiments of NICT wireless ad-hoc Mesh Network



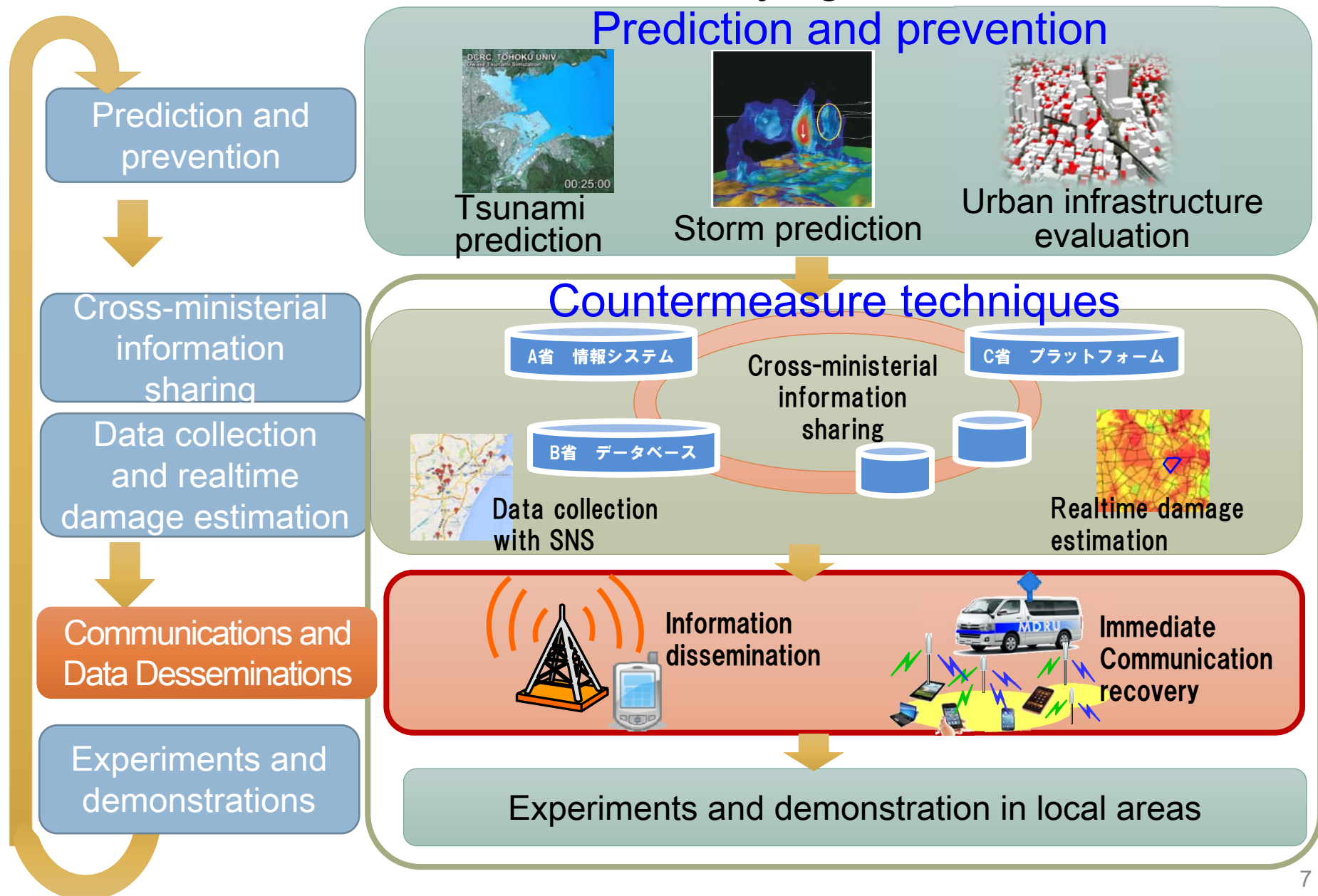
Onagawa Town, Miyagi Pref.
(local communication, video image exchange: monitoring coast area)



Shirahama Town, Wakayama Pref.
(Access to Internet; “Safe tourism”)

Overall Structure of the SIP

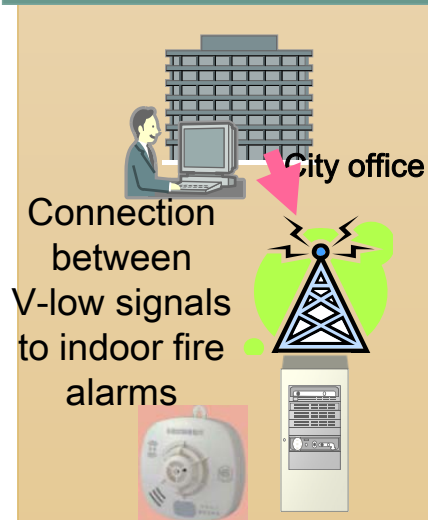
“Enhancement of societal resiliency against natural disasters”



Information Disseminations and Communications Technologies against Natural Disasters

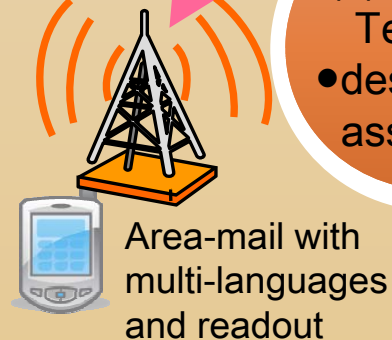
Information Dissemination

(1) Alert message sending on a new V-Low multimedia broadcast service



(2) Enhancement of Emergency Area-mail capability, to foreign and handicapped people

Area Mail Center



(5) Develop Testbed
• design and assemble

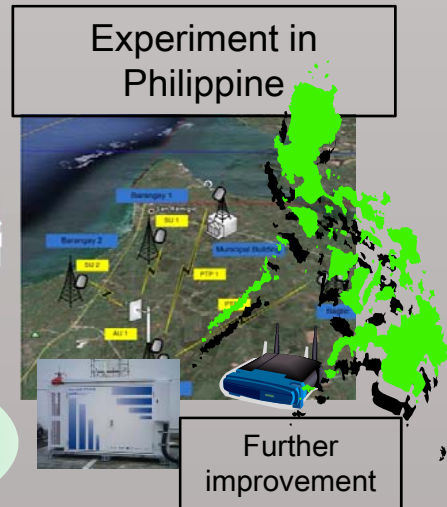
Immediate Communication Recovery

(3) Immediate rescue of communications between command office and refuges

City command office



(4) Global deployment of the R&D outcomes



Targets in three years

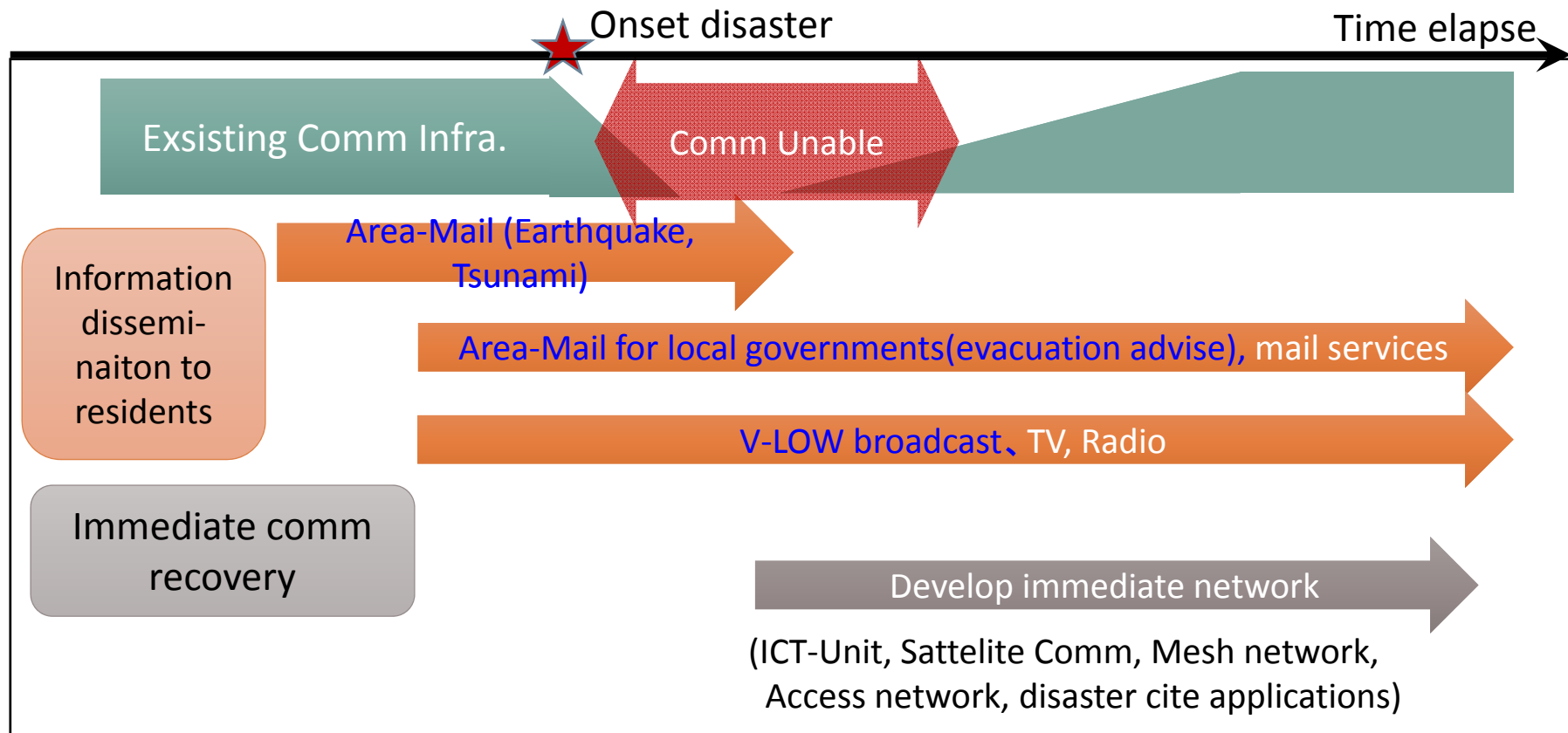
• Demonstrate to send alert messages to indoor house and shopping areas;

• Install and test Multi-language and readout functions to the Area-mail.

• Rapid recovery of communications networks with 5 km distant and 500m area.

• Standardization and global deployment of the R&D outcomes.

Time chart for R&D items to work during major disaster event



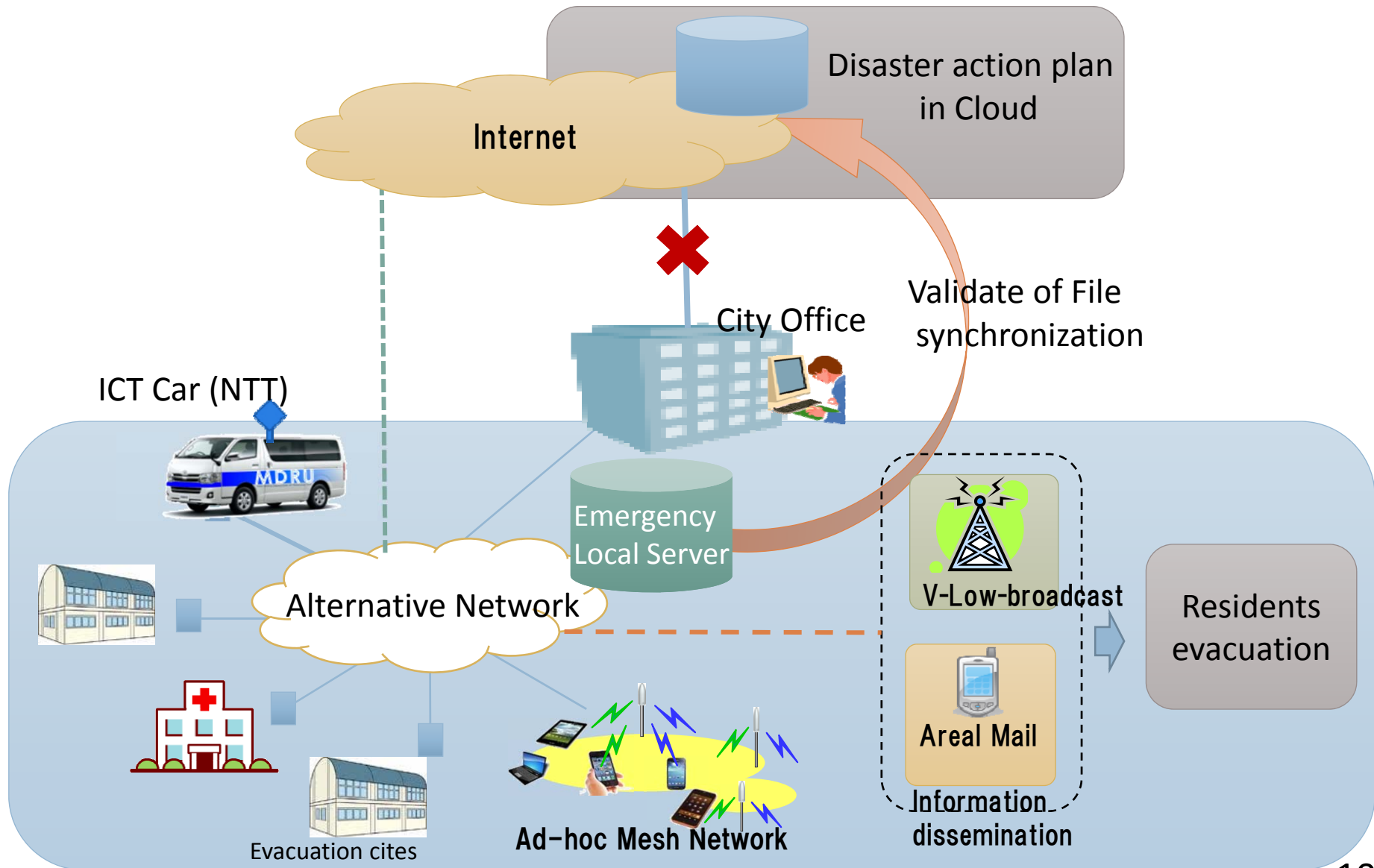
Remarks: Information Dissemination

- Tools not rely on internet nor cell phone needed (issues: congestion and electricity in conventional tools)
- Broadcasting and pin-point message dissemination needed hereafter;

Remarks: Immediate Network recovery

- Drills not using internet nor cell phone needed;
- Methods to take system to damage sites;
- Maintain and operate the system in no-emergency time;

Drill plan to support municipal office actions under disasters



Field Experiments of “Disaster Information Dissemination and Communications” in SIP (Strategic Innovation Promotion Programs)

