ITU Kaleidoscope 2011
The fully networked human?
Innovations for future networks and services

Proposal of A Wired Rural Area Network with Optical Submarine Cables

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Purpose

- How to introduce future networks to rural areas?
- Problems
    - Sparse population
    - High construction cost of a network
    - High maintenance cost of a network

- Demands for Rural area network systems
    - Low total cost
    - Fitting to features of each rural area
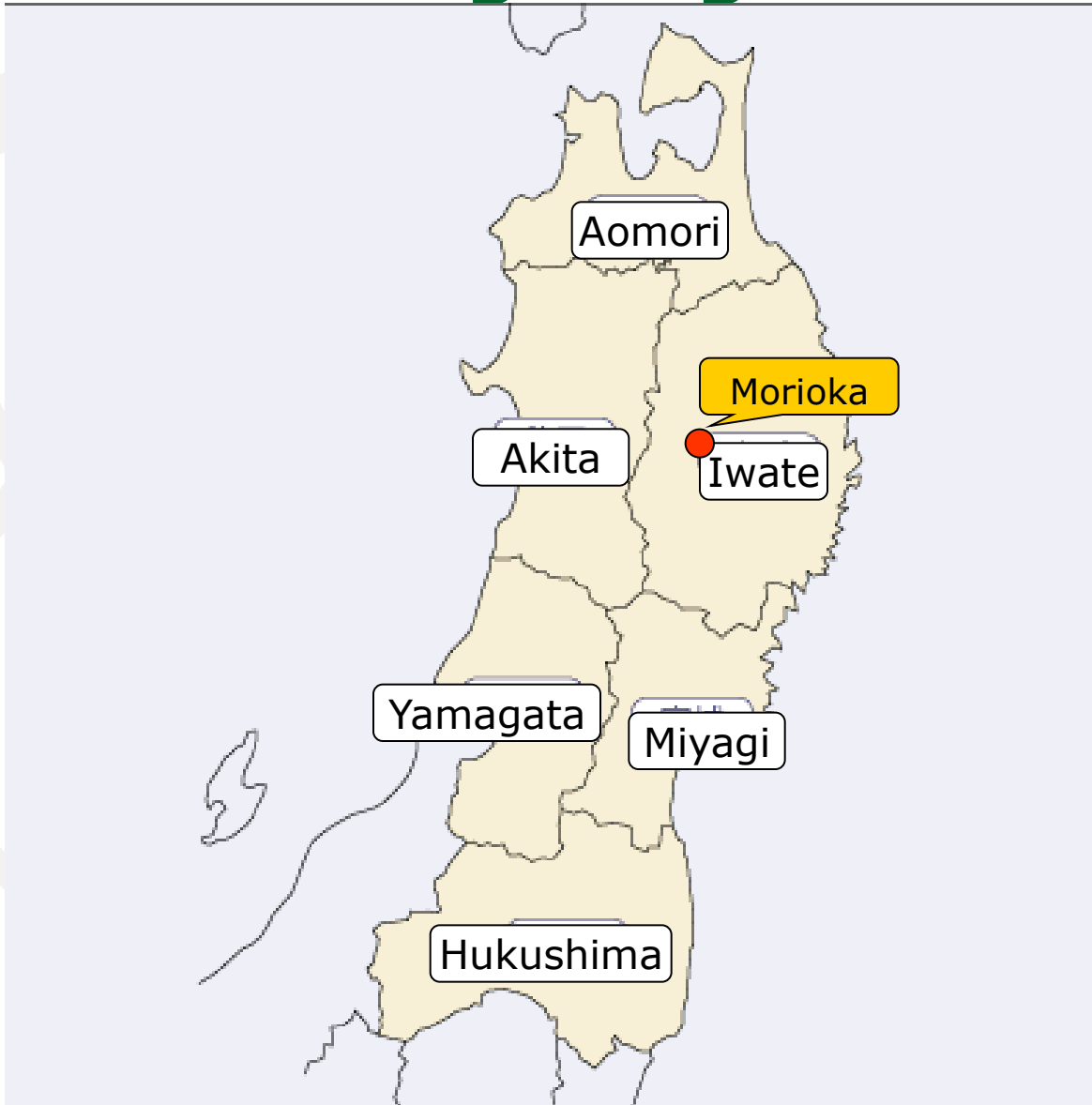
Existing Rural Area Network Systems

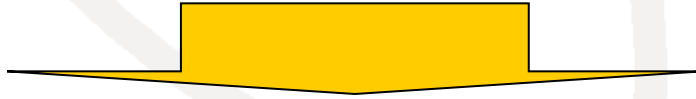□ Wireless IP access system

□ Wireless mesh network by WiFi

Internet
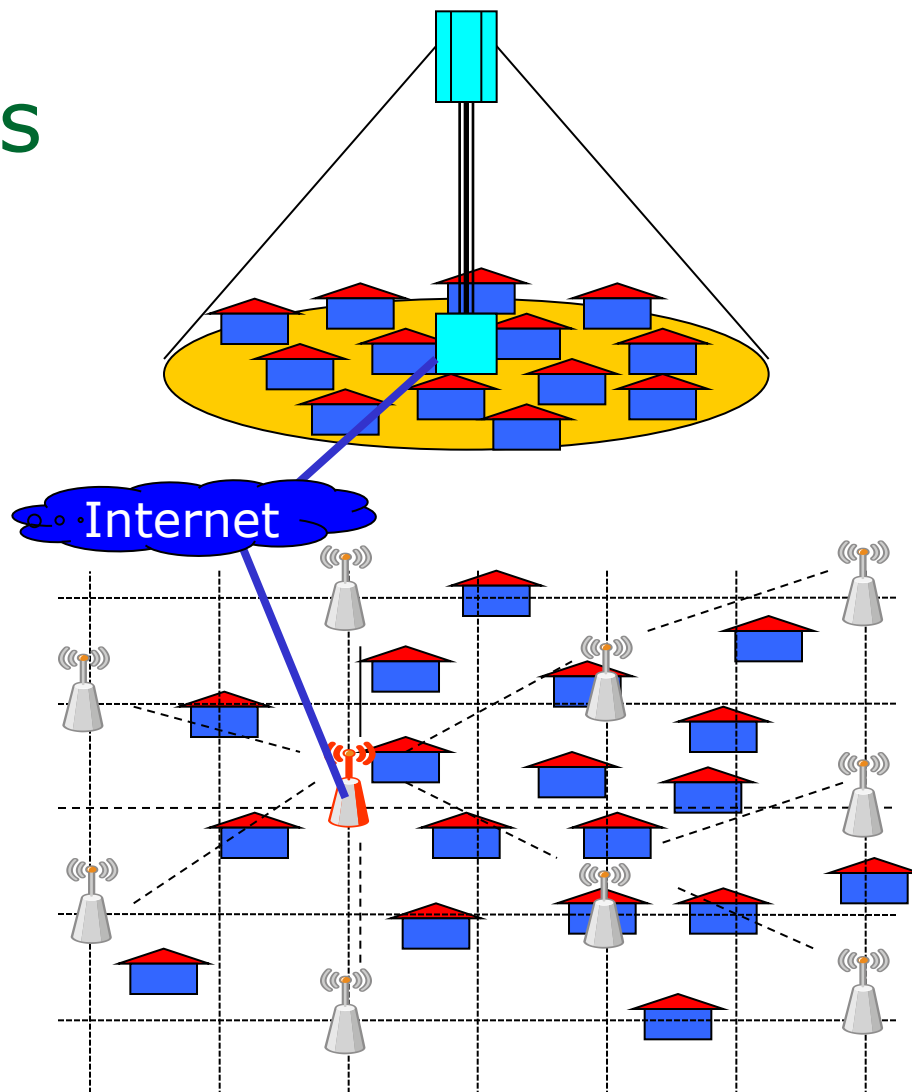
Investigating areas

Results of investigation

❏ Average number of residences is 15.
❏ There are two types:
    ❏ Clustered at a cross road
    ❏ Clustered along specific section of a road
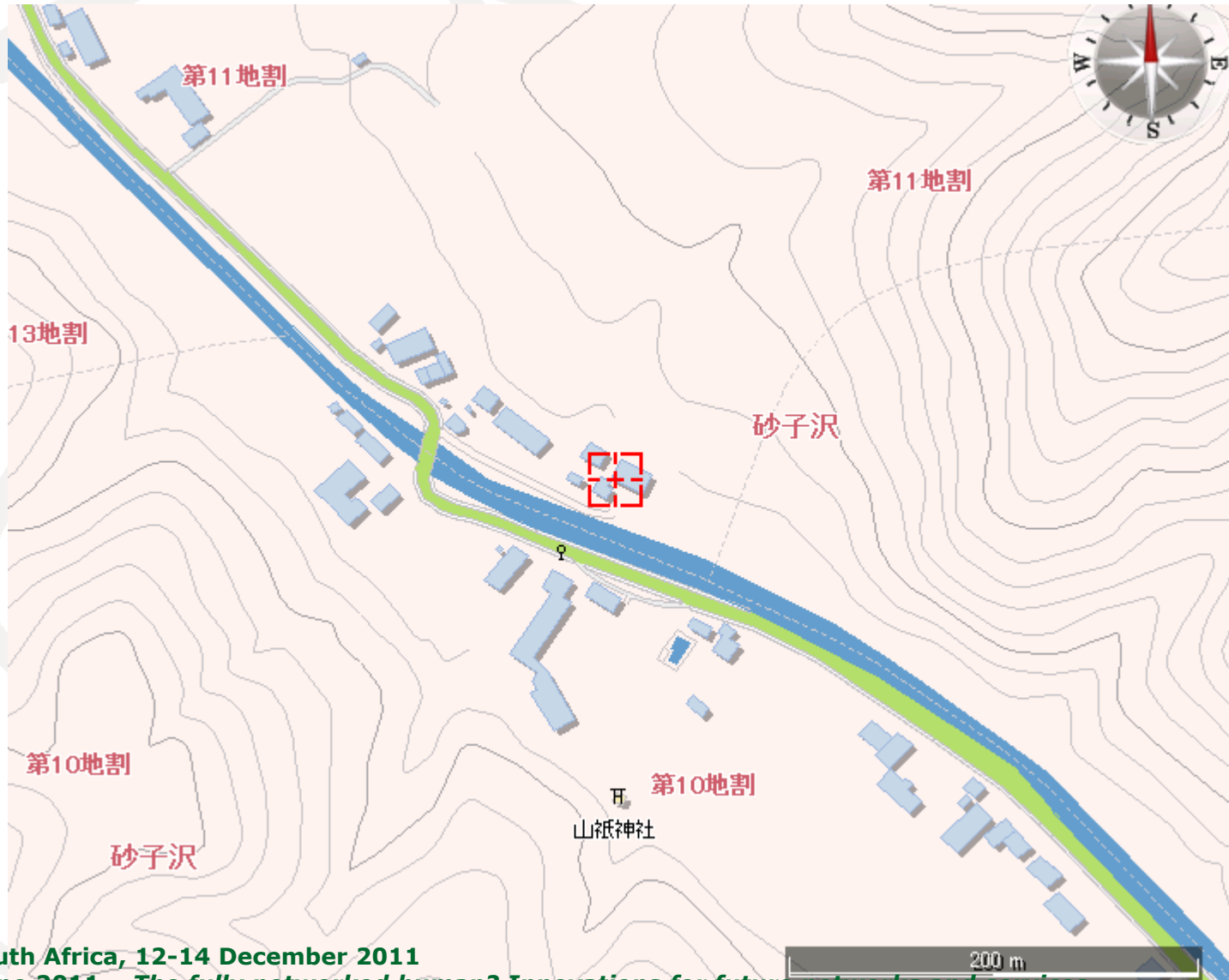❏ Interval between residences is 50–200m.

❏ They are too sparsely for the Wireless IP access system.
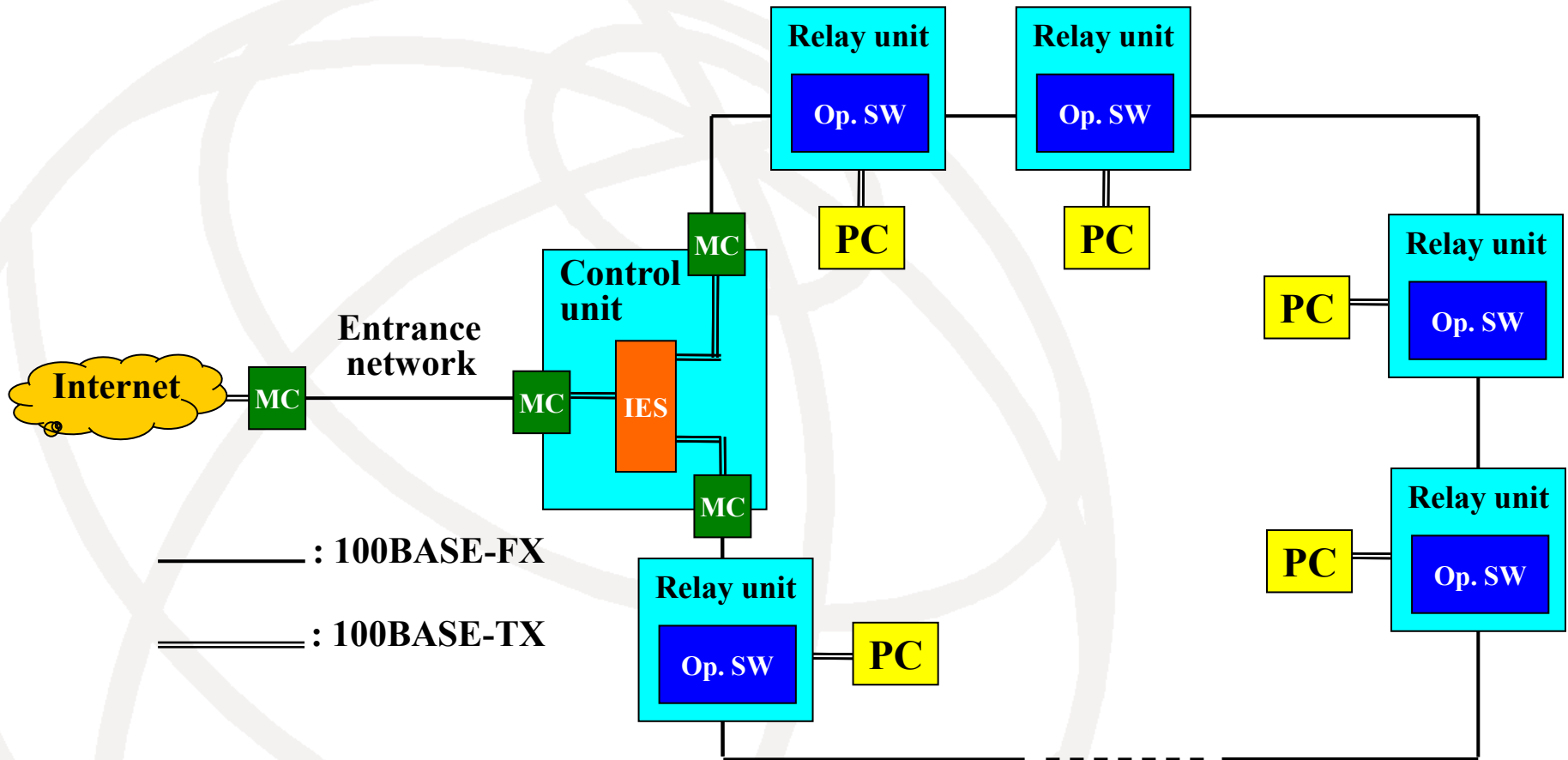❏ Residences are plotted on a line so long, and too many for both of them.

Example of residences gathering nearby a crossroad
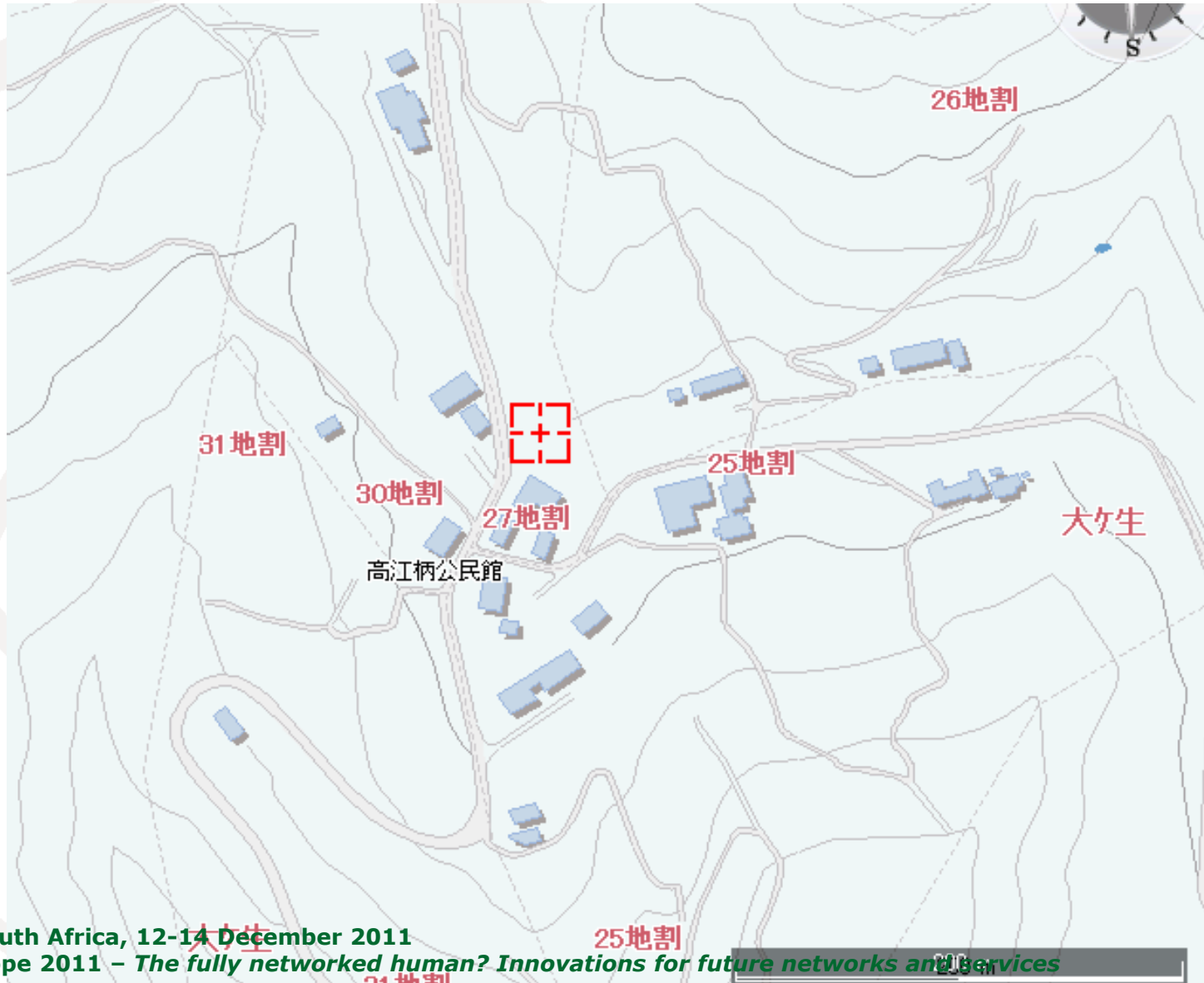
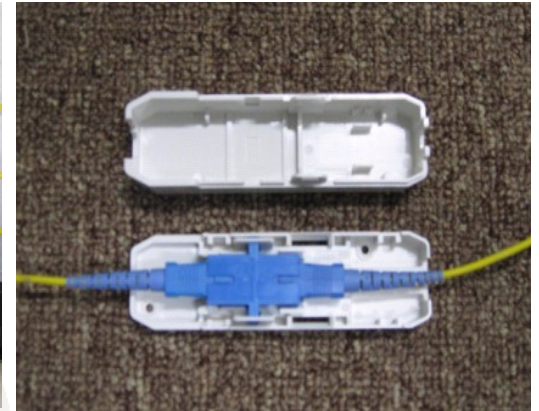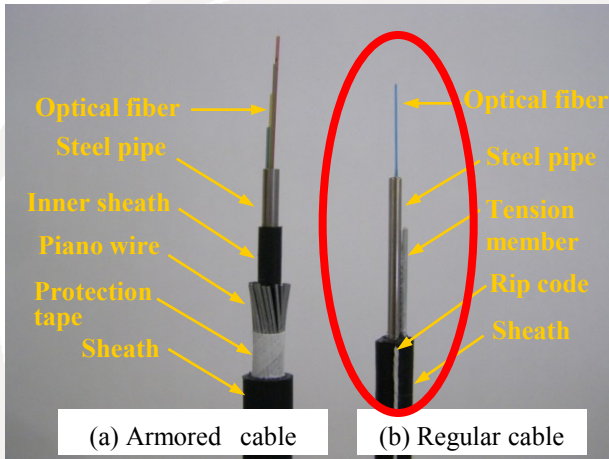# Example of residences gathering along a road

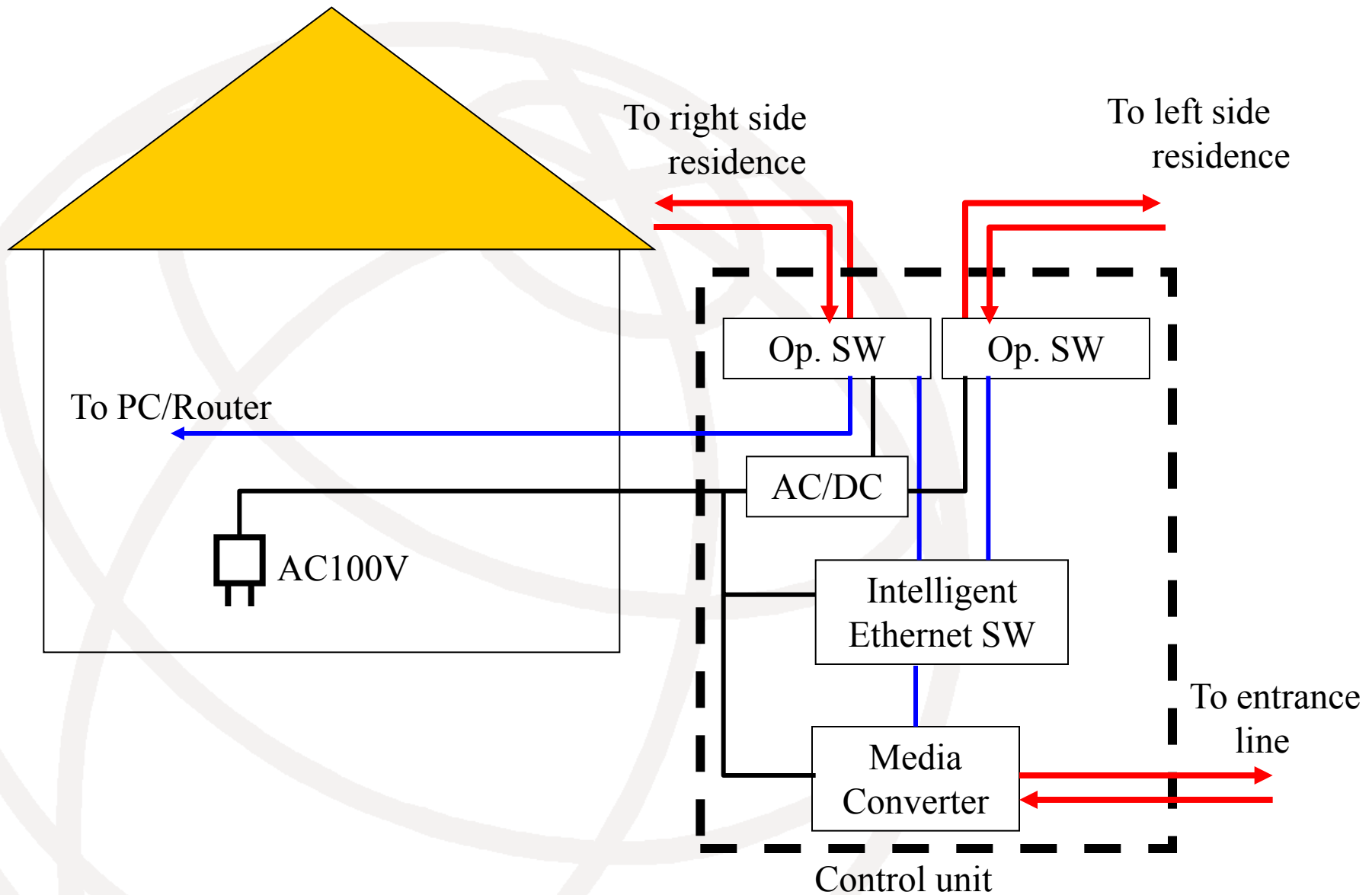# Wired rural area network with optical submarine cables, OSC-RAN

Its structure is simple to establish by ourselves for low total cost.

Usage optical submarine cables

Optical fiber
Steel pipe
Inner sheath
Piano wire
Protection tape
Sheath

Optical fiber
Steel pipe
Tension member
Rip code
Sheath

(a) Armored cable
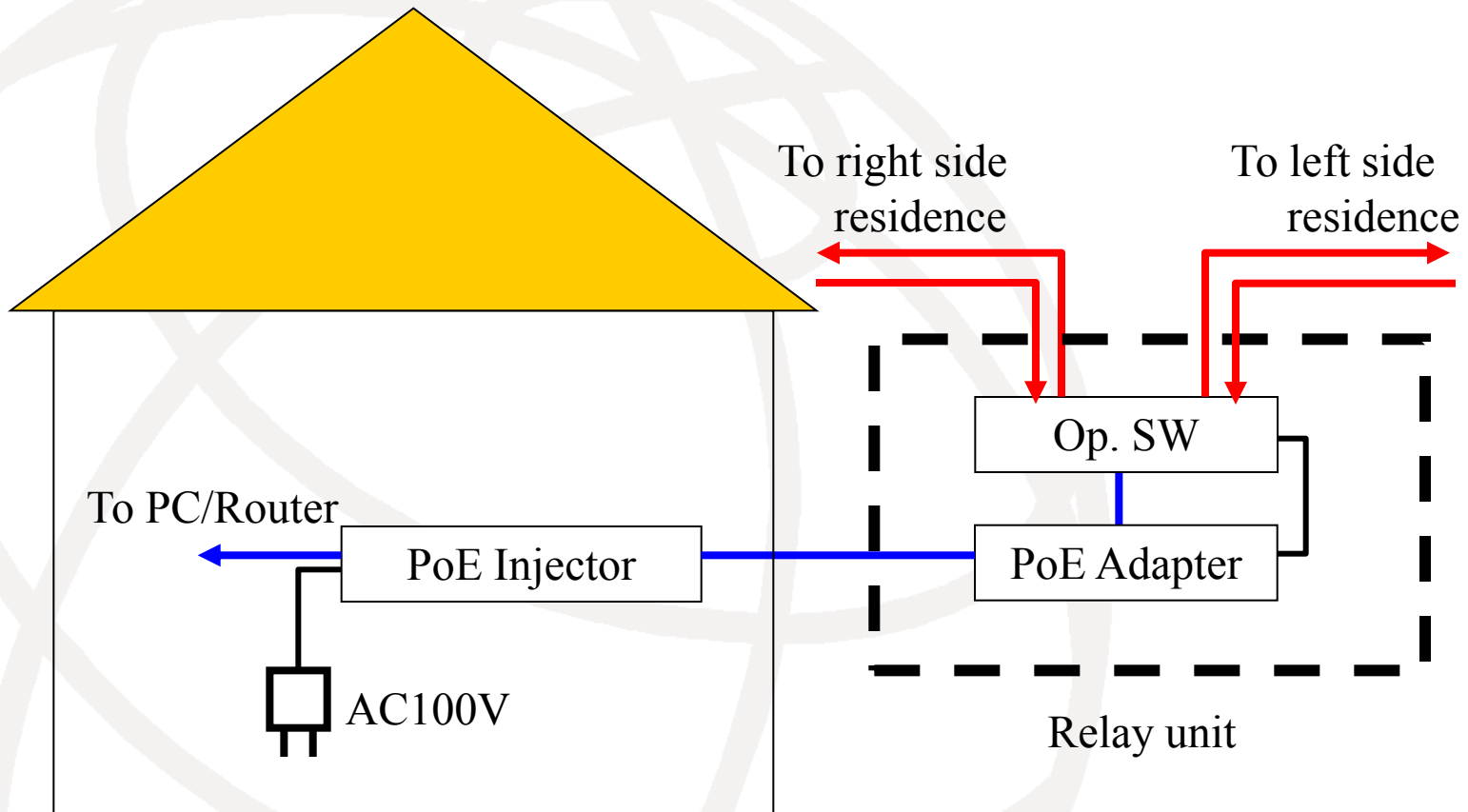(b) Regular cable

Three types cables:
- 50m / 100m / 150m
SC connectors are joined.

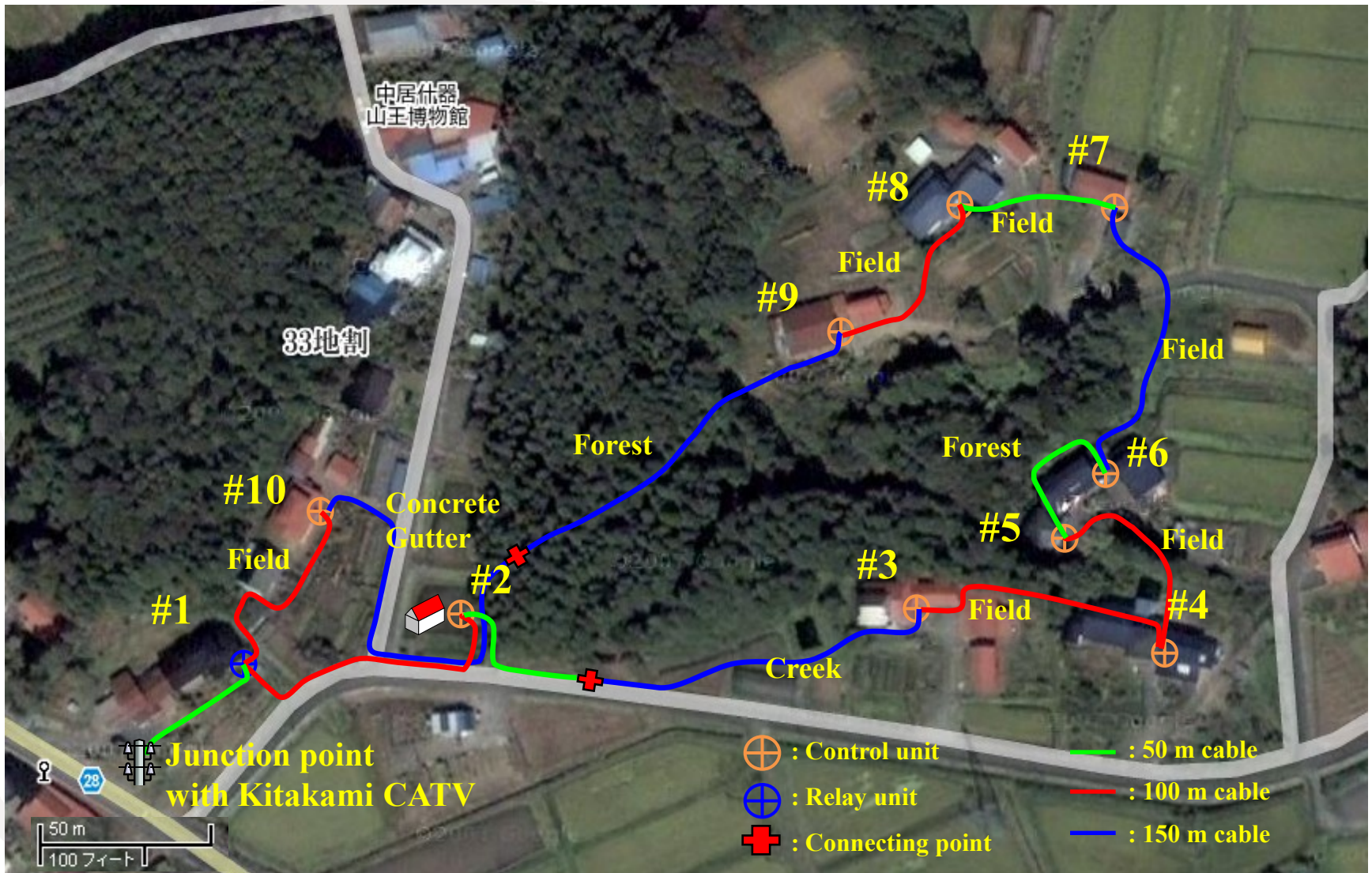# Structure of the control unit

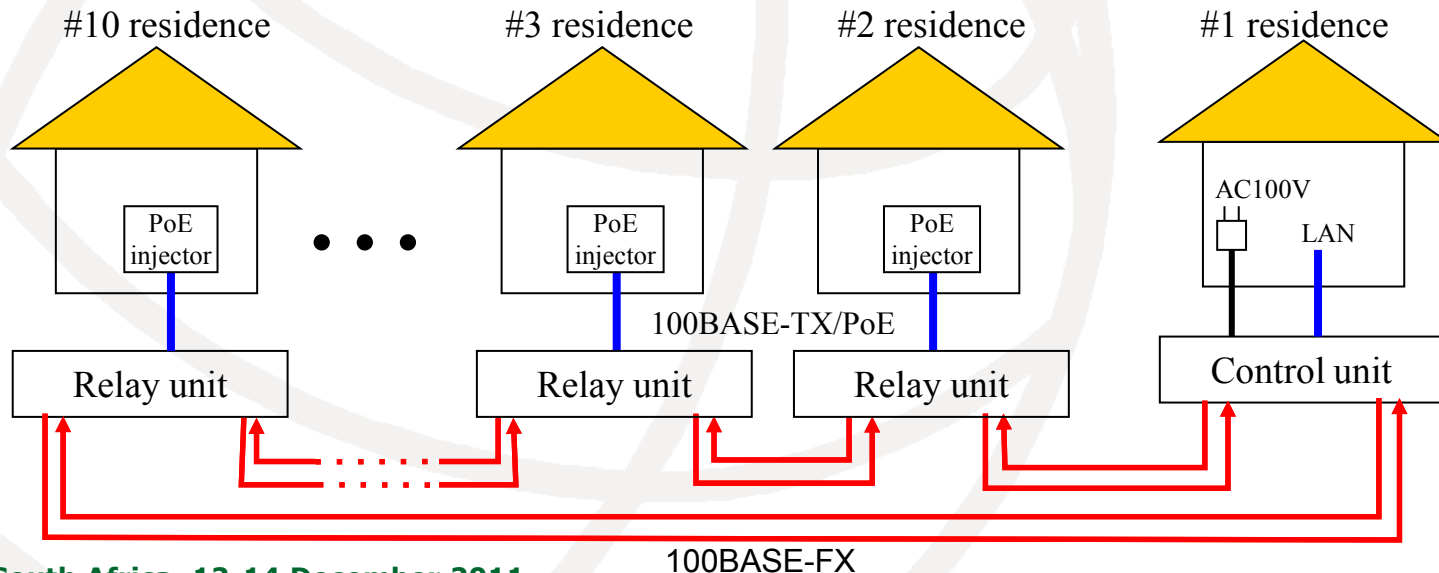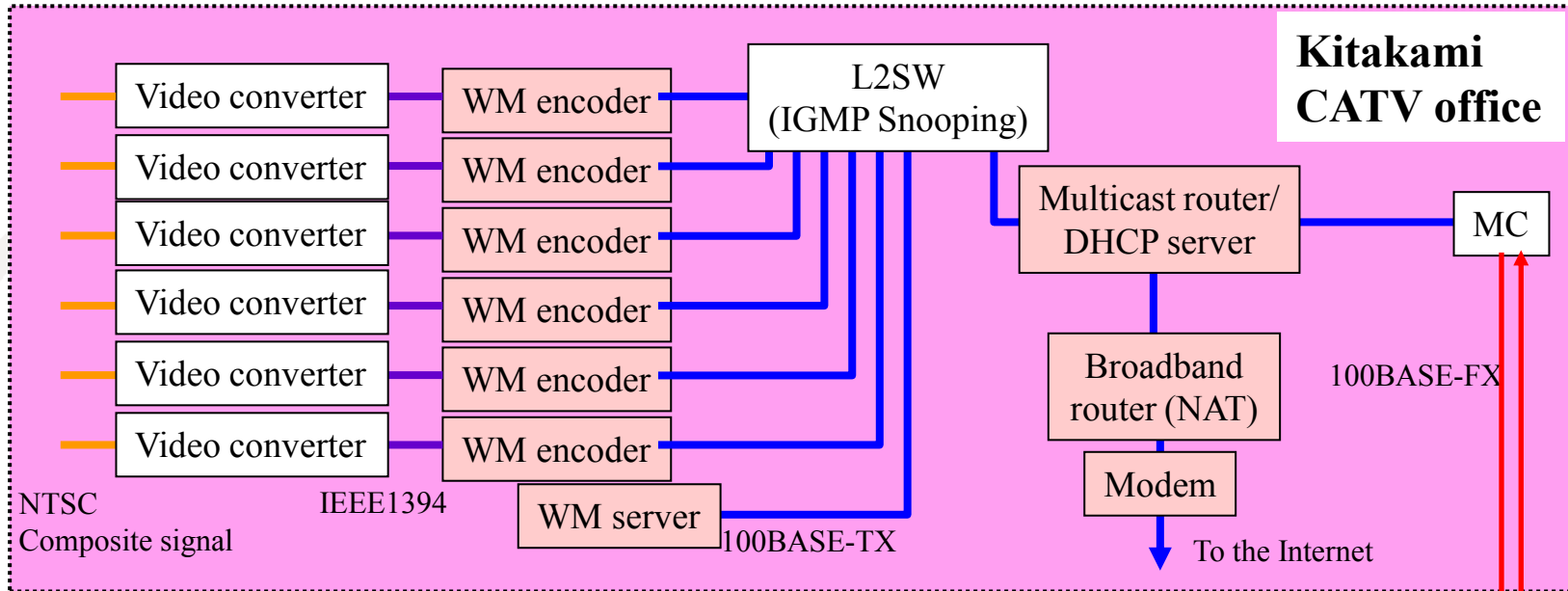# Structure of the relay unit

Field trial place

Wiring work

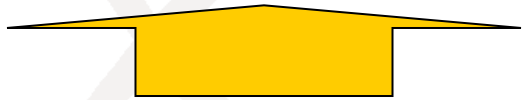**(a) Sender**   **(b) Assistant**   **(c) Drawer**

Network configuration

Summary of establishing a network

- Total working hours was 158 hours.
- It took 3 months for the network system to become stable.

- Reasons
  - Shortage of preparation and experience.
  - The daylight hours are short in winter season.
  - We have original jobs.

Summary of troubles

❑ We had 9 troubles.
  ❑ 4 of them were related to units in the office.
    ❑ WM encoders and WM server were unstable.
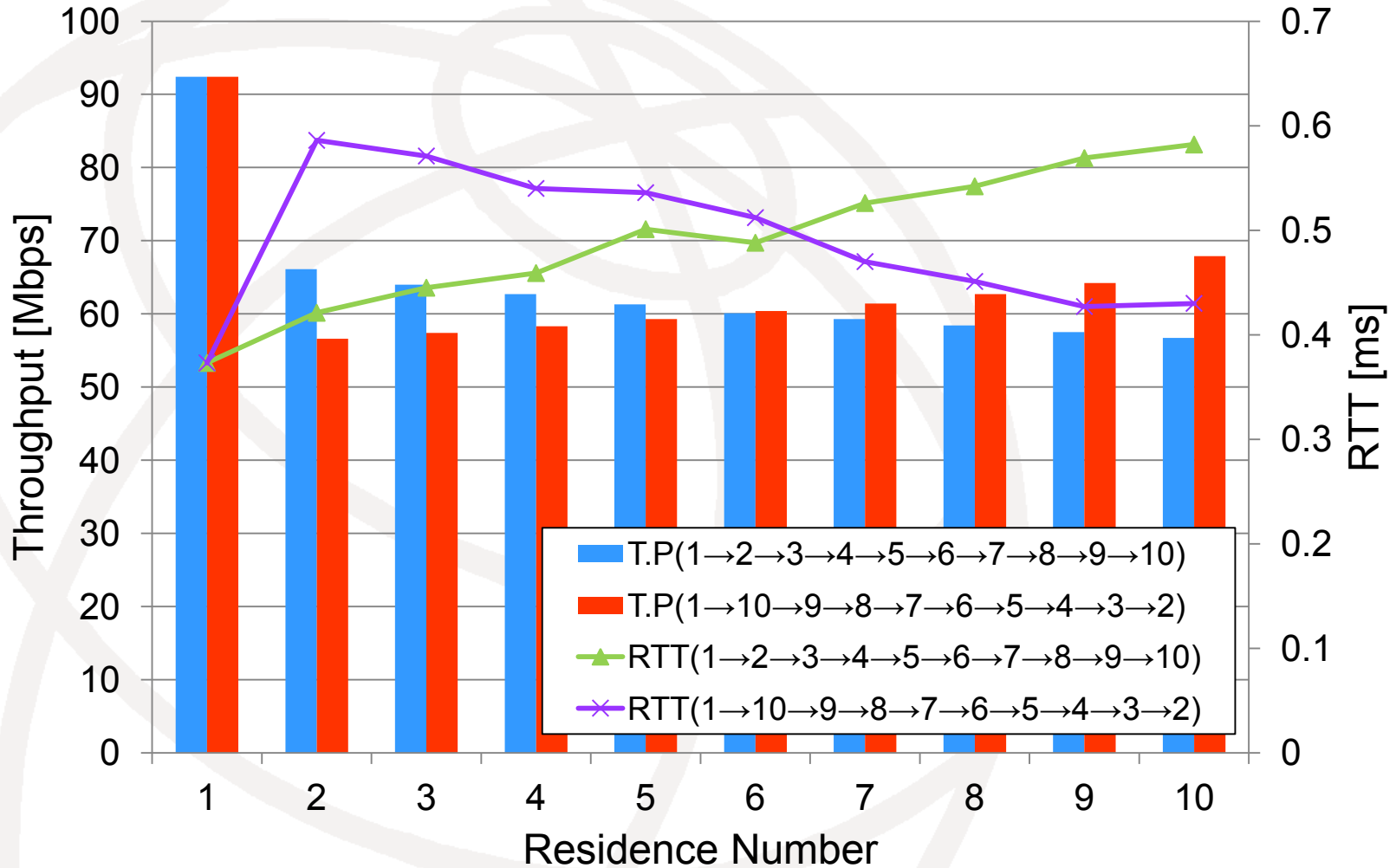   ❑ The modem and the router stopped to work.

    ❑ Shortage of maintaining above units.
  ❑ 5 of them were related to the OSC-RAN.
    ❑ A electric socket of a PoE injector was pulled off.
    ❑ A cables was cut by a snowplow.
    ❑ We missed to detect a broken connecter cable and a invalid equipment of a control unit.
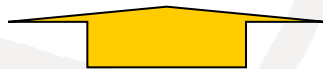
    ❑ Shortage of tests and a test manual.

Throughput and transmission delay

Questionnaires to residents

A number of access	Internet service	IP-TV service
Almost every day	2	0
4-5 days/week	2	0
2-3 days/week	3	3
Few days/week	0	4
No access	2	2
No answer	1	1

Conclusion

❑ As the result of investigation, existing wireless systems would not suited for rural areas around Morioka, north Japan.

❑ We proposed the OSC-RAN to reduce the total cost by getting residents and some helper to establish and maintain networks by themselves.

❑ Through a field trial, we confirmed that they could indeed establish and maintain a network.