Challenge for Rural Communications Development in the past and wayforward

Topical Session on Digital Divide
Jan 21 2024, PTC'24, Honolulu Hawaii

Yasuhiko KAWASUMI
Visiting Professor of SEISA Univ.
Yokohama Japan

Bearch of Mejit Island, RMI

In this presentation

1. General
2. Short history of the challenge
3. Definition of rural and remote areas
4. Author’s research activities
5. Author’s field activities
   - 5.1 Project in Bhutan
   - 5.2 Project in Nepal
   - 5.3 Project in FSM
   - 5.4 Project in RMI
6. Way forword challenge
7. Conclusion

1. General

Purpose of the ITU, Article I of the constitution;

a) To maintain and extend international cooperation between all Members of the Union for the improvement and rational use of telecommunications of all kinds,

b) To promote and to offer technical assistance to developing countries in the field of telecommunications, and also to promote the mobilization of materials and financial resources needed for implementation.

General-Continued

ITU's Challenge for Telecommunications Development;

- **One third of the global populations (2.6 billion as of 2023, updated) remain offline,**
- **To find the solutions to "connect the unconnected",**
- **To execute development of telecommunications for rural and remote areas in the developing countries,**
- **To stop global migration of workable population from rural areas to urban areas by Telecommunications development,**
- **To continue activities despite the communications infrastructure is sometimes destroyed by the regional conflicts and frequent natural disasters.**

2. Short history of the challenge

- Technical cooperation and assistance have been provided to developing countries for years in 1960s and 1970s by the resources mobilized from World Bank, UNDP, International Aid agencies,
- Missing Link report recommended to establish Center for Telecommunication Development (CTD) independently from the ITU to raise efficiently the development resources for promoting the projects,
- The report also identified the telecommunication gap between “haves and have-nots” of telephone to be tackled,
- After 5 years of CTD’s activities, Bureau for Development of Telecommunication (BDT) of the ITU succeeded the development activities in 1990,
- WTDC-98 (Valletta, Malta) set up the Focus Group on “new technologies for rural and remote applications” under the ITU-D SG2 and worked for one and a half year by collecting case studies via ITU-D website and their analysis was made. The report recommended internet style services to be widely introduced within the fist decade of the new millennium.

Short history of the challenge-Continued

- The report profiled the new technologies including satellite-based internet access, IMT-2000 cellular systems and Wireless Local Loop (WLL) for rural applications such as remote education, remote healthcare and electronic commerce, community grid with renewable power source, etc.,
- The study of the telecommunications development for rural and remote areas is succeeded by the ITU-D Study Group 1 or 2 rapporteur's group,
- World Summit on Information Society (WSIS) took place in Geneva and Tunis in 2003 and 2005 respectively [10], and the list of action lines (C1～C11) was given in the Tunis Agenda, C7 of the action line as in the following is moderated by the ITU; e-government, e-business, e-learning, e-health, e-employment, e-environment, e-agriculture.

3. Definition of rural and remote areas

The report of ITU-D SG2 rapporteur's group (2006-2010) defined the general features of rural and remote areas as follows;

1) Lack of basic infrastructure (telecommunications infrastructure, electricity, access road, water supply, sewer system, etc. difficult living conditions),

2) Low geographical population density (small village populations, in sparsely populated communities that are geographically separated from one another),

3) Low economic activities,

4) High degrees of illiteracy,

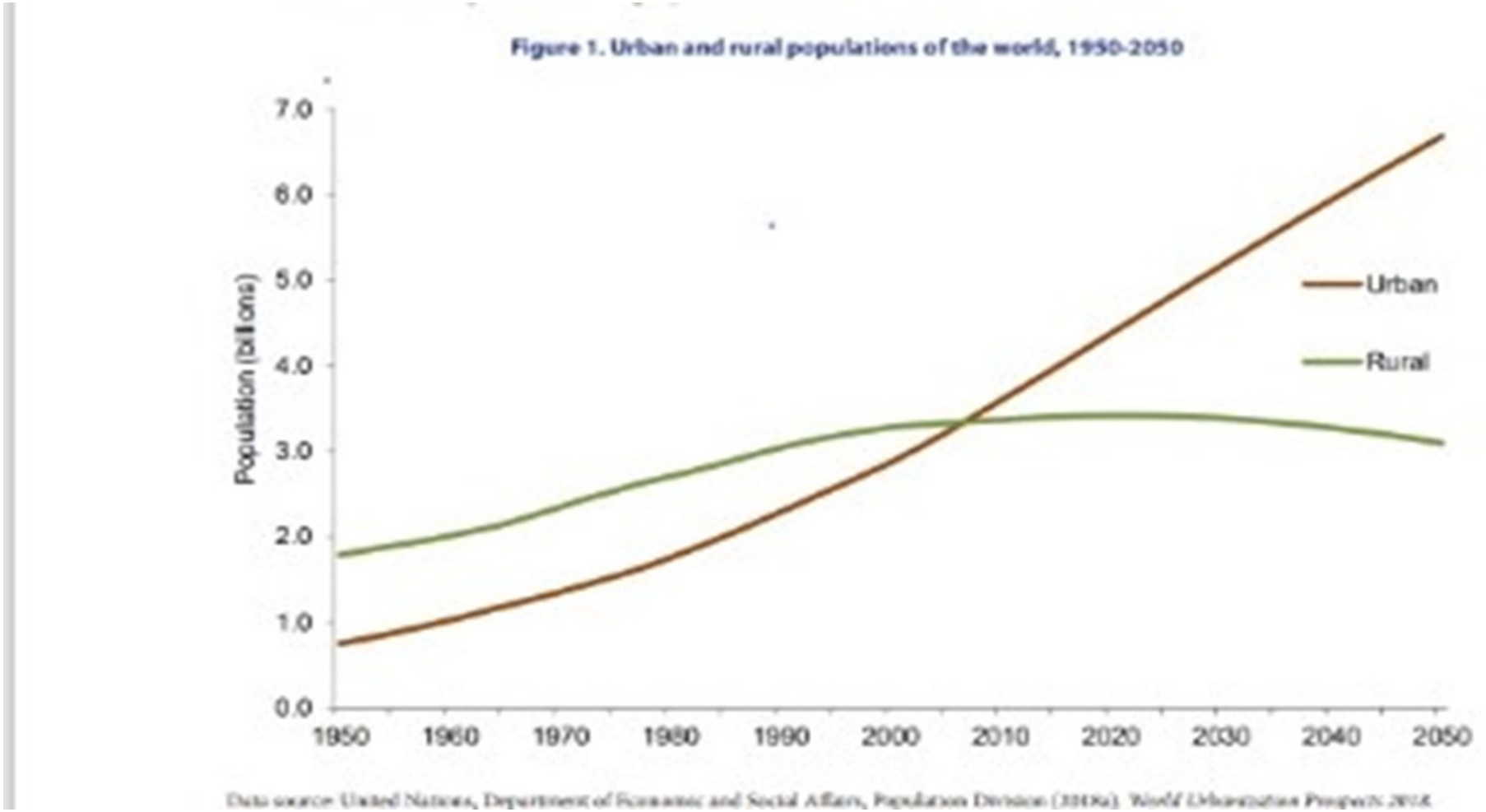
5) Lack of information and social administrative services,

6) Marginalized group (women, children and elderly people, disables) are left in the areas,

7) Difficult geographical and environmental conditions (mountainous, isolated by water, harsh climate etc.),

8) Among others.

Difficult living conditions of rural and remote areas accelerates the rapid migration to urban areas



4. Author's research activities

- ITU-D Study Group 1 or 2 on the question of "telecommunications/ICTs for rural and remote areas" for three study cycles (12 years) as rapporteur,
- The rapporteur's group under the SG during 2002-2006 and 2014-2017 conducted global survey twice by sending the questionnaires to membership,
- It was found that the workable male populations (between 16 and 55, inclusive respectively) are leaving to urban areas or outside the countries to get the income to support the family left in the rural and remote areas.

Findings of global survey (problems)

1) Lack of or inadequate basic enabling infrastructure such as regular electricity supply,

2) Absence of telecommunications infrastructure,

3) The relative high cost of telecommunication infrastructure,

4) Geographic access problems due to distance, terrain, poor quality of road/transport network and remoteness of some rural communities,

5) Cost of physical access and equipment installation due to any combination of the above geographically related issues,

6) Low income, lack of disposable income and relative poverty of rural population,

7) Low geographic density of target population (i.e. small village populations, in sparsely populated communities that are geographically separated from one another),

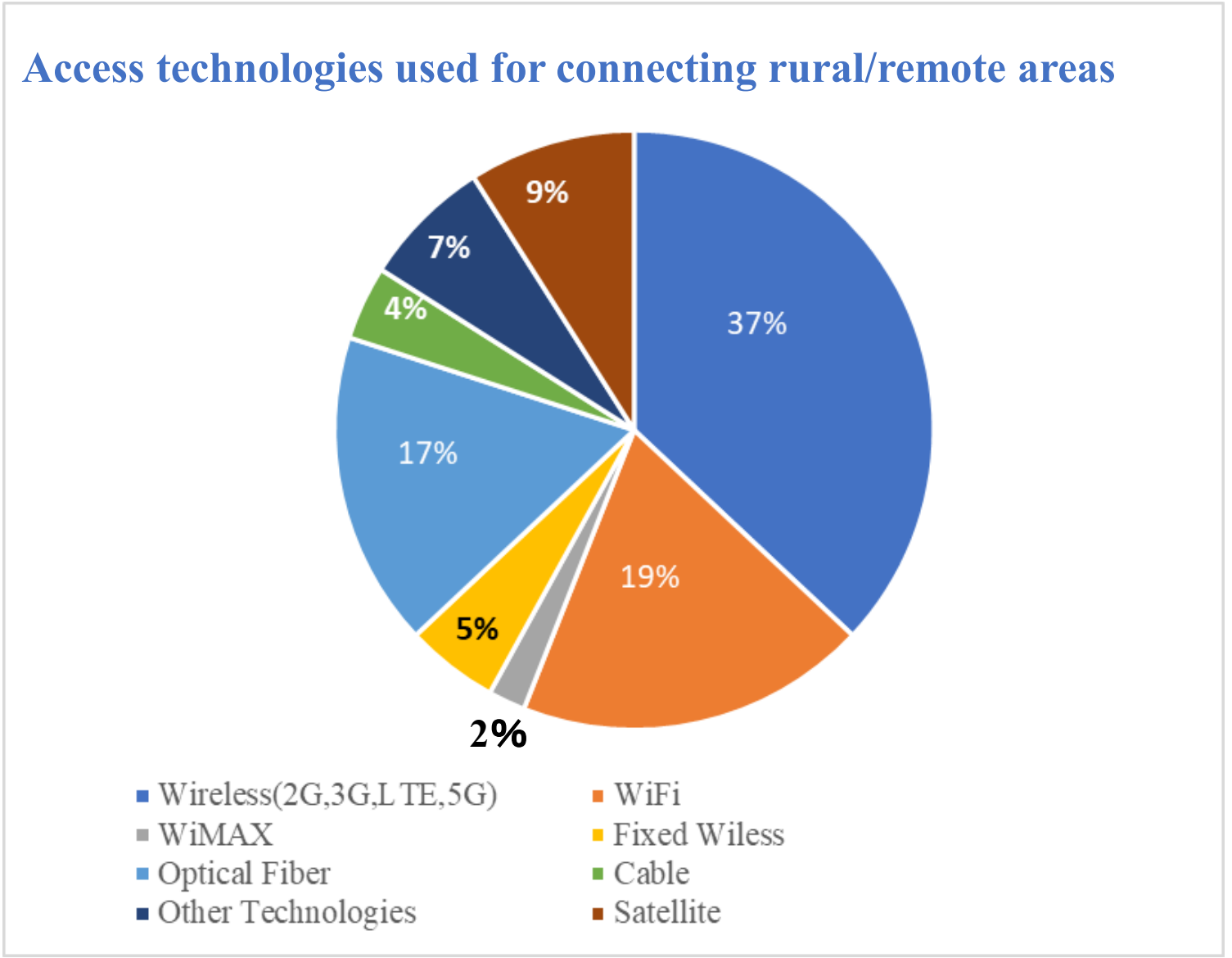
8) High degrees of illiteracy in some rural areas,

9) Overall lack of funding (both public and private subsidies),

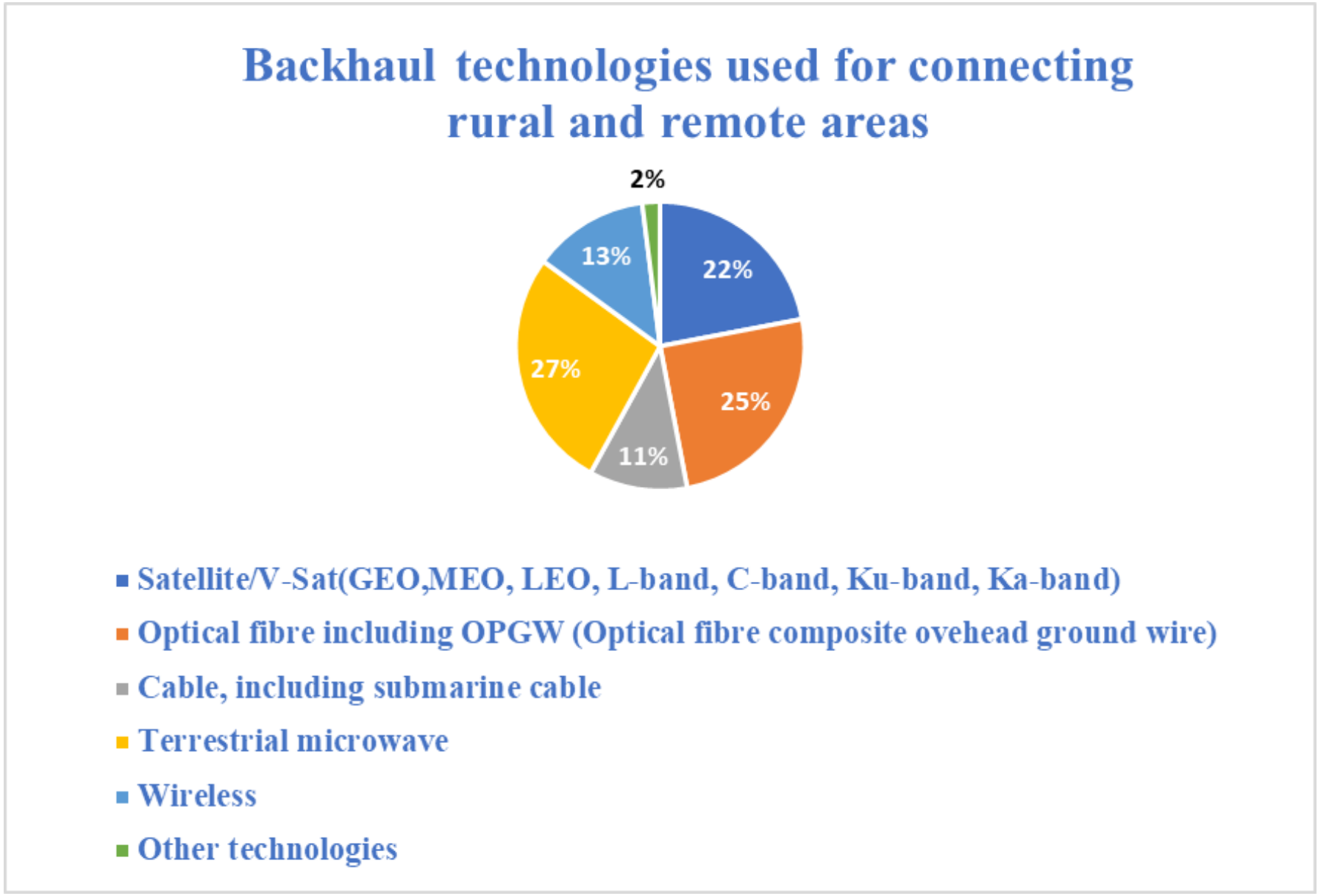
10) Commercial viability of telecommunication services resulting in the least interest of service providers,

11) Among others.

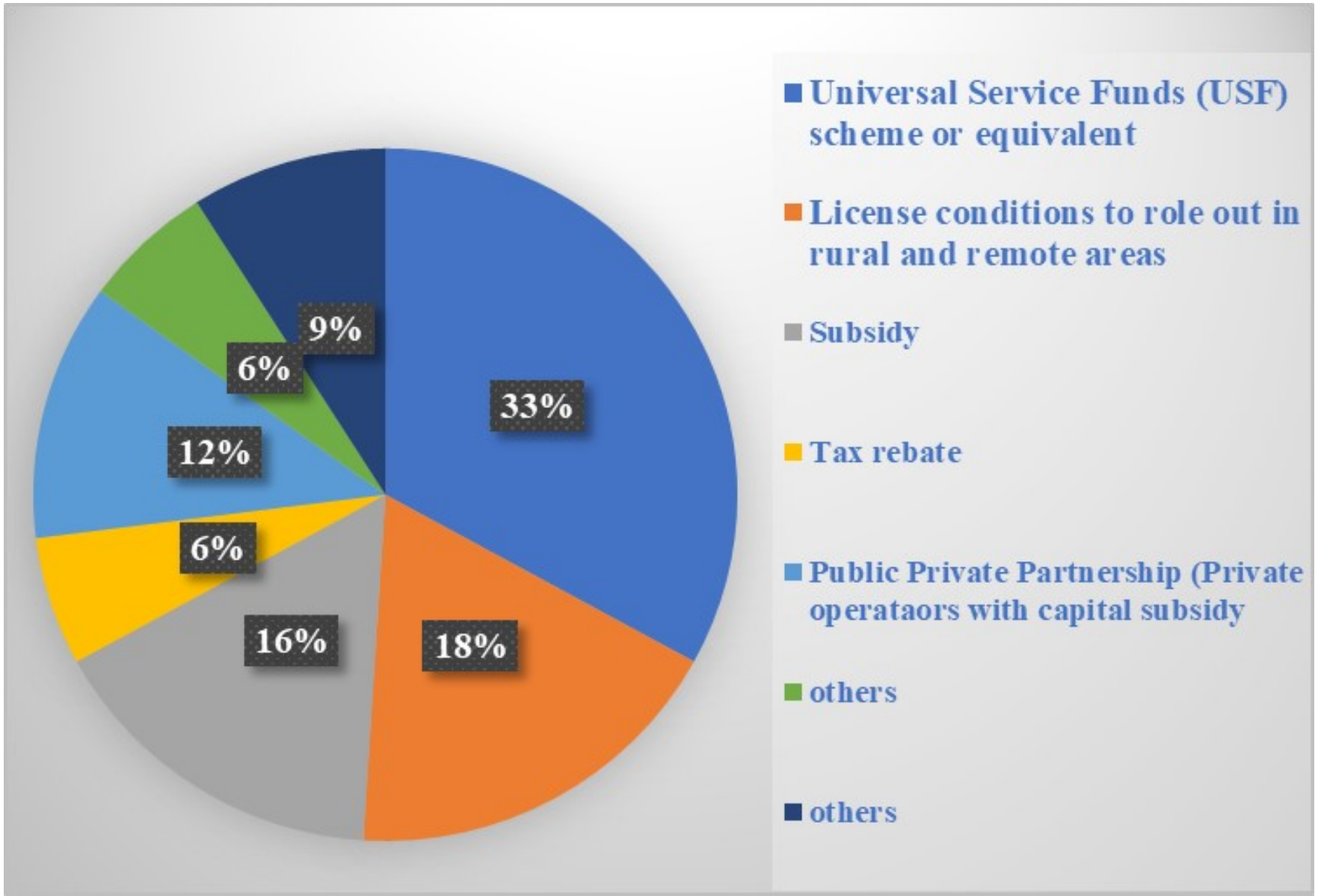
Findings of global survey (Access Technologies)



Findings of Global Survey (Backhaul Technologies)



Findings of Global Survey (Strategies adopted for funding development of infrastructure for rural and remote areas)



5. Author's field activities

- **5.1 Bhutanese Rukubuji village project.**
- **Provided internet connectivity (2005) by donating 66 recycled laptop computers from a Japanese Telecom operator,**
- **The village has the community mini-hydro power grid,**
- **Villagers could enjoy the TV viewing at the tele-center via satellite,**
- **O&M were provided by national operator,**
- **Later additional project was provided by the financial support of APT as the next phase (2011).**

Bhutanese project photos

Tele-center at the village school

Internet kiosk in the village

Satellite antena provided by the incumbent operator

Author's field activities

- **5.2 Feasibility Study mission to Nepali Himalayan villages, and connectivity provided to villages.**
- **Author participated in ITU mission to assist Nepal Wireless Networking Project operated and maintained by Mr. Mahabir Pun （famous Nepali practitioner/community leader),**
- **ITU Bangkok donated WiFi equipment and associated devices. The mission team trekked ten villages in Myagdi district staying in the guest houses for ten days,**
- **Villages are connected via WiFi and wireless local loop (WLL) at the school based multi-purpose tele-centers,**
- **Later, wireless network was upgraded by the WiMAX and broadband WLL using TV white space spectrum funded by APT and other sourced of international institute,**
- **Technical team consisting of Japanese engineers supported by the ITU and APT funds assisted the Mahabir's tele-centers, health posts and community computer centers in schools connected to Nepal Wireless Networks,**
- **In 2017, APT funded the additional project to expand Nepal Wireless Networks to 16 mountain villages by WLL deploying VHF TV white space spectrum, and Trekker Tracking System (TTS) deploying wireless tags, the transfer of lead-acid battery regeneration technology and extension of network to Mustang region by WLL were provided.**

Nepali project photos

ITU mission team in Myagdi

One laptop per child computers in a village school

Mahabir Pun in a school computer center

A village woman carrying drinking water on head

Mahabir Pun setting up antenna at a relay station

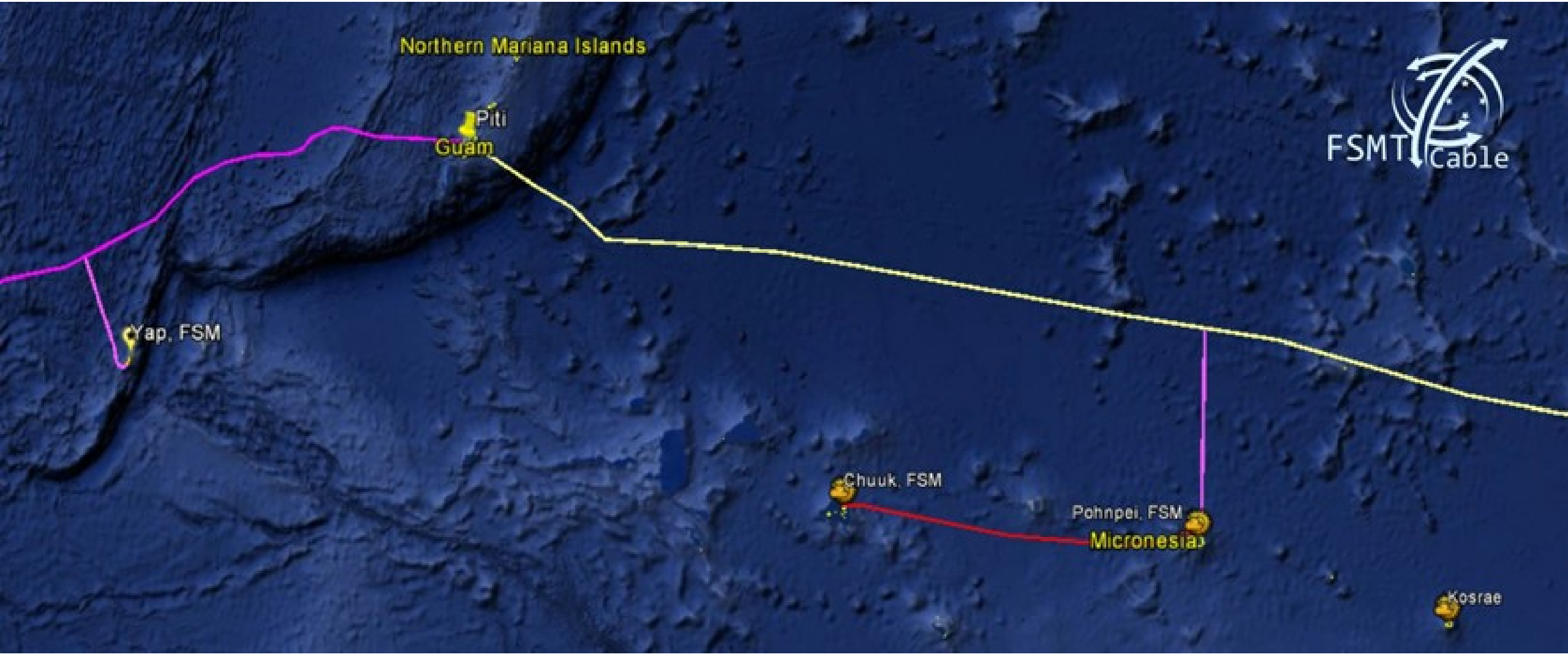
WLL antenna fixed on a top of tree

Author's field activities

- **5.3 Pilot project of school based tele-centers for Federated States of Micronesia (FSM).**
- **Three school based tele-centers in Pohnpei, Chuuk, and Kosrae states were established by the APT funded pilot project in 2009,**
- **Recycled computers were donated by the KDDI with the collaboration of TC&I and DoE of Micronesian government,**
- **FSM Telecom supported to connect three schools in three states via satellite link and WLL,**
- **Workshop and training for local school teachers were provided by the Japanese expert at three locations,**
- **The state of Yap was provided the tele-center at next phase of APT pilot project,**
- **Optic submarine cable network to connect three states of FSM (Yap, Chuk and Pohnpei) via Guam and outer world. Extension to Kosrae, Nauru and Kiribati is projected in the very near future.**

FSM's submarine cable network to connect three states

(Quoted from FSMT Cable Home page)



Author's field activities

- **5.4 Extension of mobile phone connectivity via satellite to Mejit island of Republic of Mar shall Island (RMI).**
- **RMI is Small Island Developing States (SIDs) consisting of 29 atolls and 5 islands. Mejit island is one of 5 islands isolated by about 400 km from its capital of Majuro on the main atoll**
- **Population is 420 individuals and 85 families. Inhabitants rely on riches of the surrounding ocean and a few fruit bearing trees on the island,**
- **At that time only telecommunication system was short wave radio via an operator to the capital for commercial, personal and emergency communication,**
- **With the C-band geostationary (GEO) satellite connection via Marshall Island National Authority (MINTA) and femto-cell base station,**
- **Islanders benefited for use of cellular phone and other telecommunication services such as e-health consultation with the hospital of Majuro at the health post of the island, and e-learning at the school and e-government service,**
- **Electricity is supplied only by solar power and windmill power together with lead-acid battery,**
- **Optic fiber fusion splicing machine and its technical training workshop were provided to MINTA (National Telecom Authority) staff at the later phase by the APT funded project.**

RMI's project photos

Mejit islanders using Inmarsat BGan satellite terminal

Mejit women islanders carrying goods by the island transportation system

Air Marshall flies once a week between Mejit and Majuro (the capital of RMI)

Cargo ship comes once a month or two months to bring commodity goods to Mejit

6. Way Forword

- New emerging technologies suitable for rural and remote areas application will soon be available,
- Low earth orbit (LEO) satellite constellations which may globally provide services covering pacific islands and landlocked areas which will be expected to “connect the unconnected areas” of Asia and Pacific countries in the near future,
- There will be problems to be tackled by the stakeholders such as coordination among constellations for orbits, frequency spectrum issues, clearing space debris after the life time of LEO,
- Affordability of usage charge for rural population, availability of technical experts for rural areas, development of appropriate e-applications and raising awareness of the benefit of ICT services by the rural population,
- Among others.

7. Conclusion

- To achieve "connect the unconnected", it is vital to provide the connectivity to small islands in the south pacific and mountain villages of landlocked counties of Asia,
- There are more than 25 thousand of inhabited small islands in the south pacific, so in the case of mountain villages of land locked countries of Asia,
- Investment should be more encouraged in such unprofitable rural and remote areas and make efforts to generate traffic demand for efficient use of broadband over optic submarine cable and LEO constellation networks,
- Government subsidies through the regulatory scheme of universal service obligation and universal service fund raised by setting aside a portion of communication charge, service licensing fee, frequency spectrum fee, etc.,
- Bringing up the domestic telecommunication installation companies in SIDs and LLDC is needed,
- Electrification by renewable energy sources for rural and remote community is another challenge.

Thank you !!