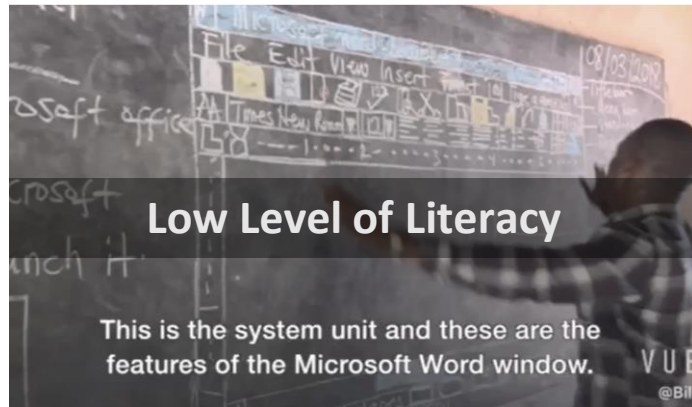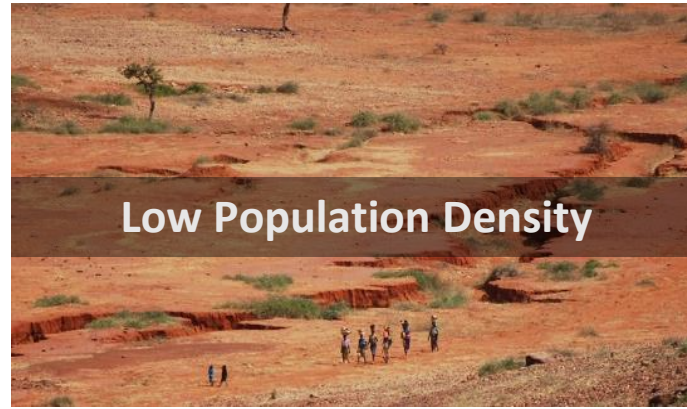# Last Mile Connectivity
## Technical Solution and Supportive Policy

Factors deter digital connectivity in unserved areas

Difficult Terrain

Low Population Density

Lack of Electricity

Low Level of Literacy

This is the system unit and these are the features of the Microsoft Word window.
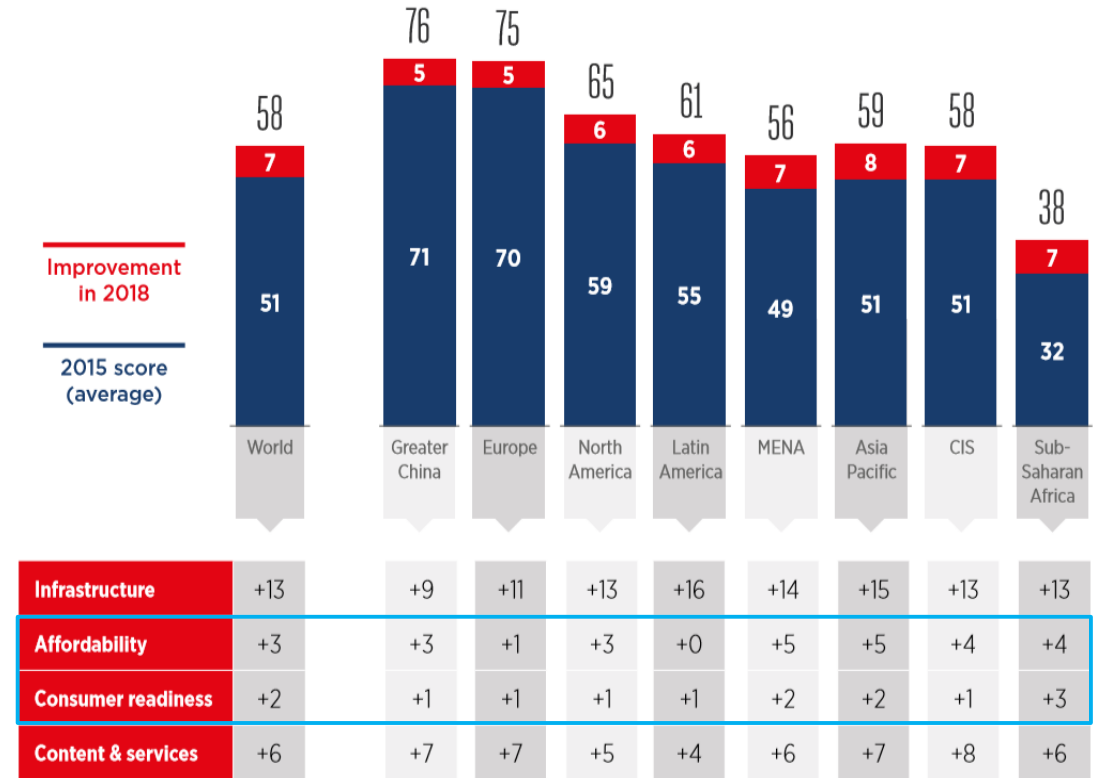
Low Per Capita Income

Poor Return on Investment

Usage gap caused by affordability and readiness is the bottleneck

State of global mobile internet connectivity by region, 2019

GSMA Mobile Connectivity Index scores, 2018
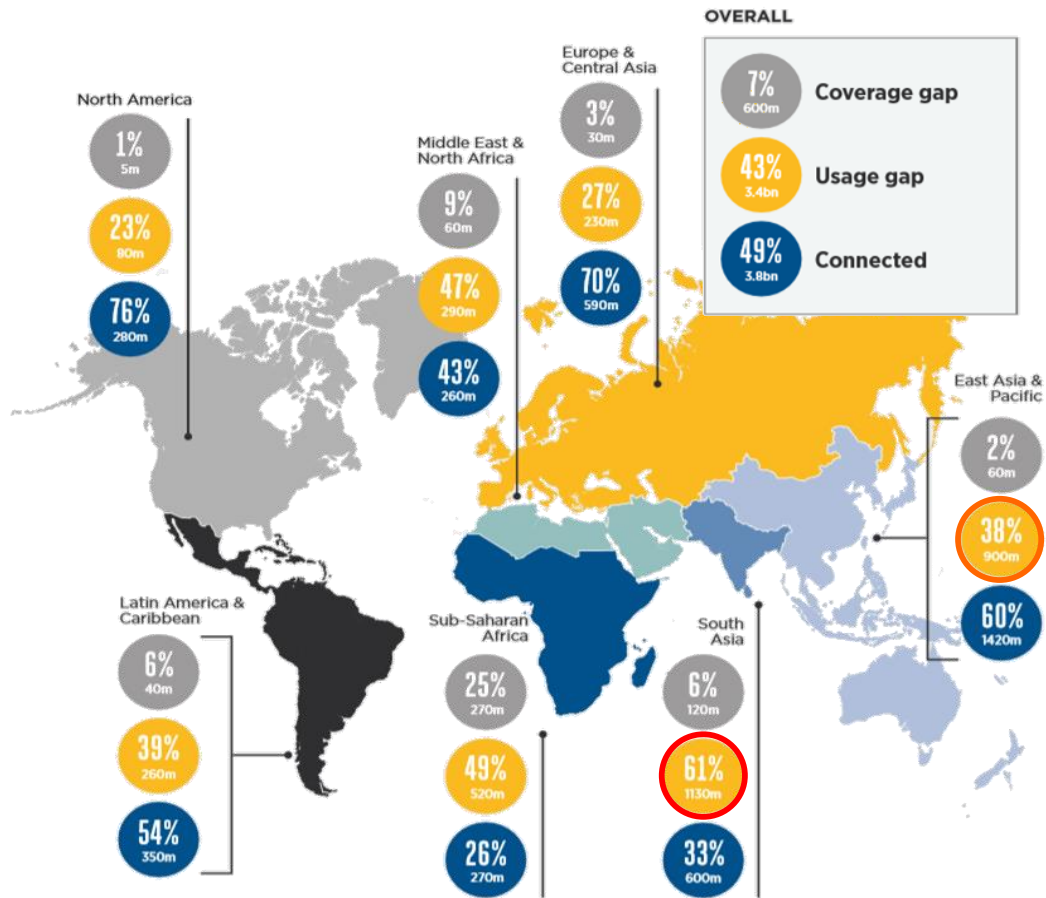
Usage gap is the major connectivity barrier in Asia Pacific

Lifting up user affordability and readiness are real challenge

Supportive policy measures to gear up MBB connectivity

Key Barriers of MBB Connection

Coverage Gap

Usage Gap

4 Enablers

Infrastructure

Affordability

Consumer Readiness

Content & Service

16 Dimensions

- Network coverage
- Meaningful connectivity
- Cost of deployment
- Spectrum availability

- Mobile tariffs
- Handset price
- Disposable income
- Taxation

- Mobile ownership
- Digital literacy/skills
- Awareness/benefits
- Gender equality

- Content availability
- Local relevance
- Payment/identification
- Online security

4 Readiness

Spectrum Ready

- IMT spectrum activated
- Dual Sub-1GHz bands

Site Ready

- Coverage/density
- Site acquisition/sharing

User Ready

- Device affordability
- Digital literacy for usage

Service Ready

- Affordable MBB packs
- Sufficient local content
- Mobile payment

3 Engines

National Strategy

- NBN with clear objective on MBB coverage
- Impose universal service obligation on Sub-1GHz
- QoS on demand

Incentive Measure

- Policy incentives, eg. tax
- Financial aid by USF
- Ensure profit gain for sustainability

Foster Innovation

- Collaborative strategies and partnership
- Reshape business model
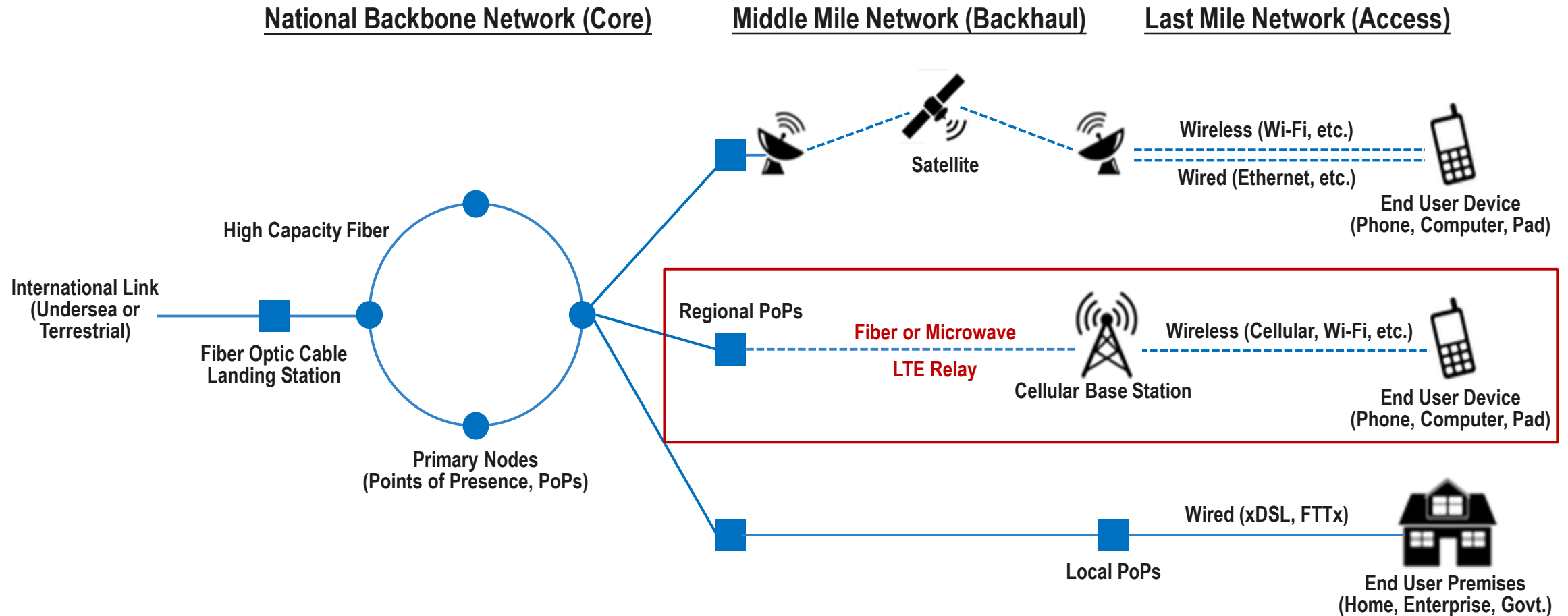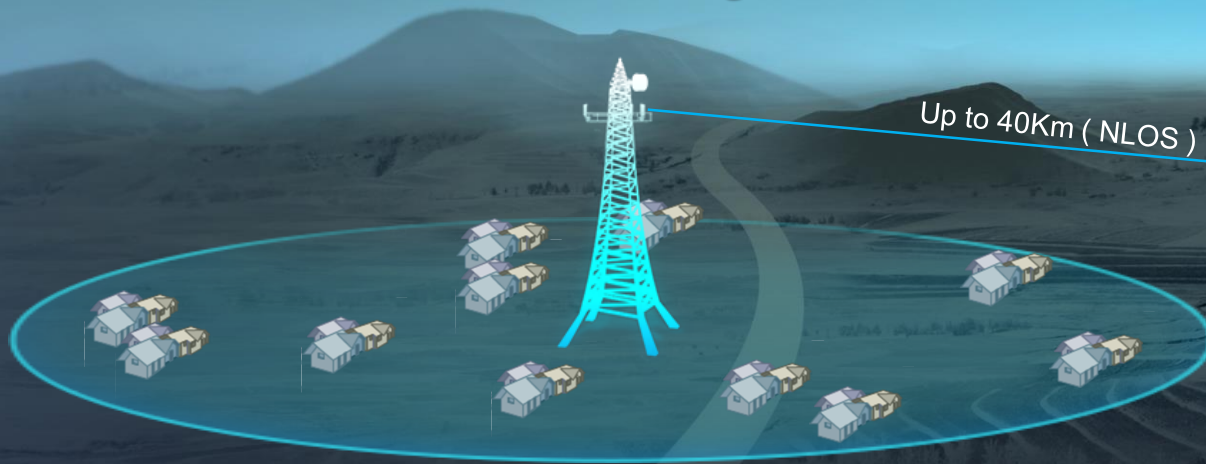- Seed capital to foster local content and start-up

Source: GSMA, Huawei Intelligence

Various technical solutions complemented to maximize coverage

National Backbone Network (Core)   **Middle Mile Network (Backhaul)**   **Last Mile Network (Access)**

High Capacity Fiber

Satellite

Wireless (Wi-Fi, etc.)

Wired (Ethernet, etc.)

End User Device
(Phone, Computer, Pad)

International Link
(Undersea or
Terrestrial)

Fiber Optic Cable
Landing Station

Primary Nodes
(Points of Presence, PoPs)

Regional PoPs

Fiber or Microwave

LTE Relay

Cellular Base Station

Wireless (Cellular, Wi-Fi, etc.)

End User Device
(Phone, Computer, Pad)

Wired (xDSL, FTTx)

Local PoPs

End User Premises
(Home, Enterprise, Govt.)

Innovative MBB solution extend coverage with extremely low cost

Wide Coverage

Up to 40Km (NLOS)

Ultra-Rural Coverage

Rural Coverage

RuralStar Lite

Sparse-populated village (0.5K-1K)

6-9m pole, LTE relay, solar

Donor Site (edge BTS)

Dense-populated village (>3K)

High tower (>30m)
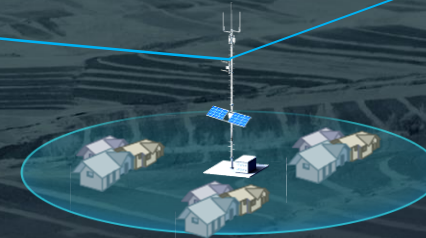
RuralStar

Less-populated village (1K-3K)

12-24m pole, LTE relay, solar

"3 Transfer"

Stretch 60km

Reduce 50% TCO

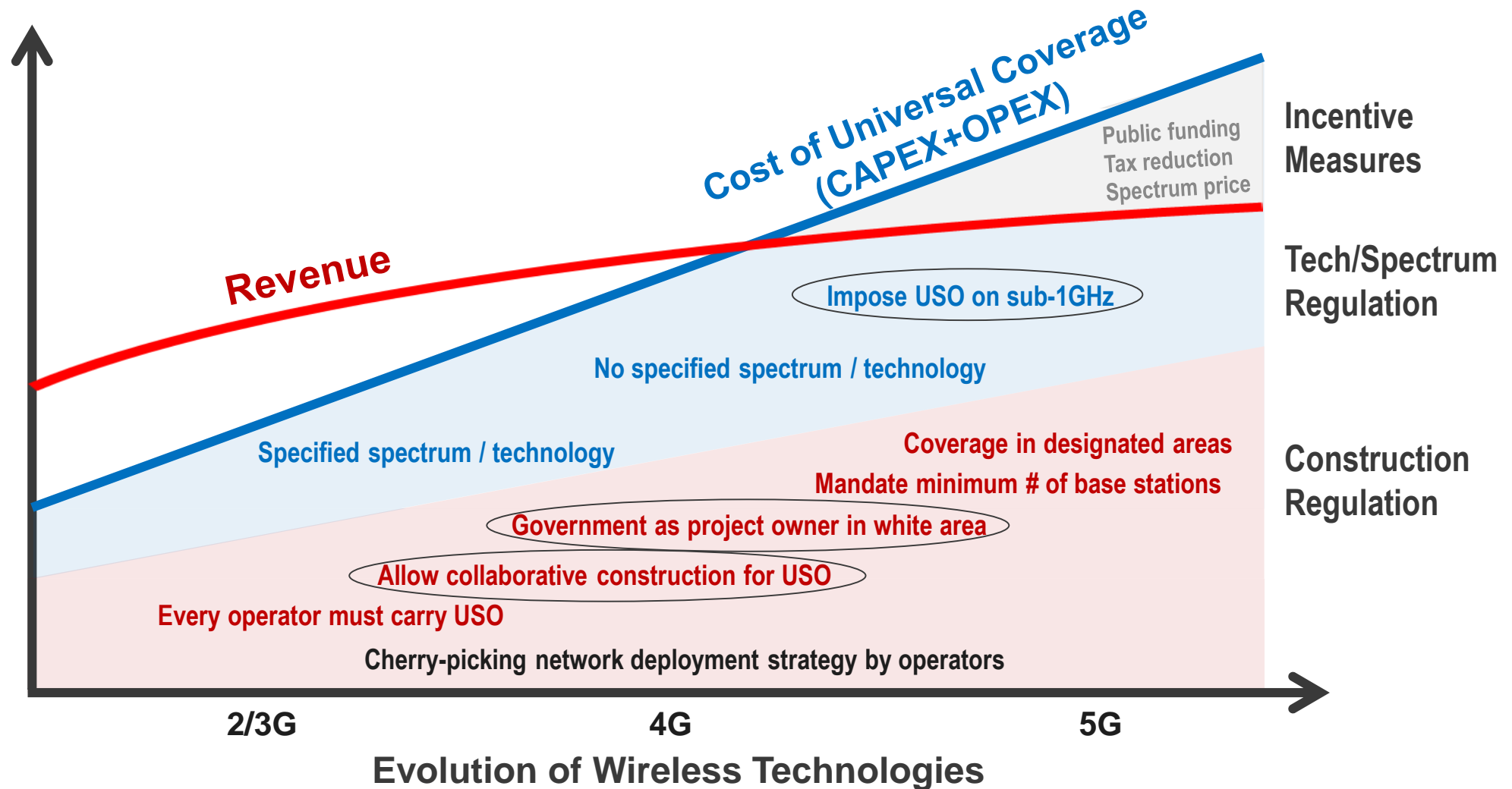**Backhaul:** VSAT/MW to **LTE Relay (NLOS)**

Infrastructure: Tower to **Pole**

Power: D.G to **Solar**

Spectrum: In-band/out-of-band **Flexibility**

O&M: visual **Remote** management

Regulatory evolution on universal service obligation

Cost of Universal Coverage (CAPEX+OPEX)

Public funding
Tax reduction
Spectrum price

Incentive Measures

Revenue

Impose USO on sub-1GHz

Tech/Spectrum Regulation

No specified spectrum / technology

Specified spectrum / technology

Coverage in designated areas
Mandate minimum # of base stations

Construction Regulation

Government as project owner in white area

Allow collaborative construction for USO

Every operator must carry USO

Cherry-picking network deployment strategy by operators

2/3G   4G   5G

Evolution of Wireless Technologies

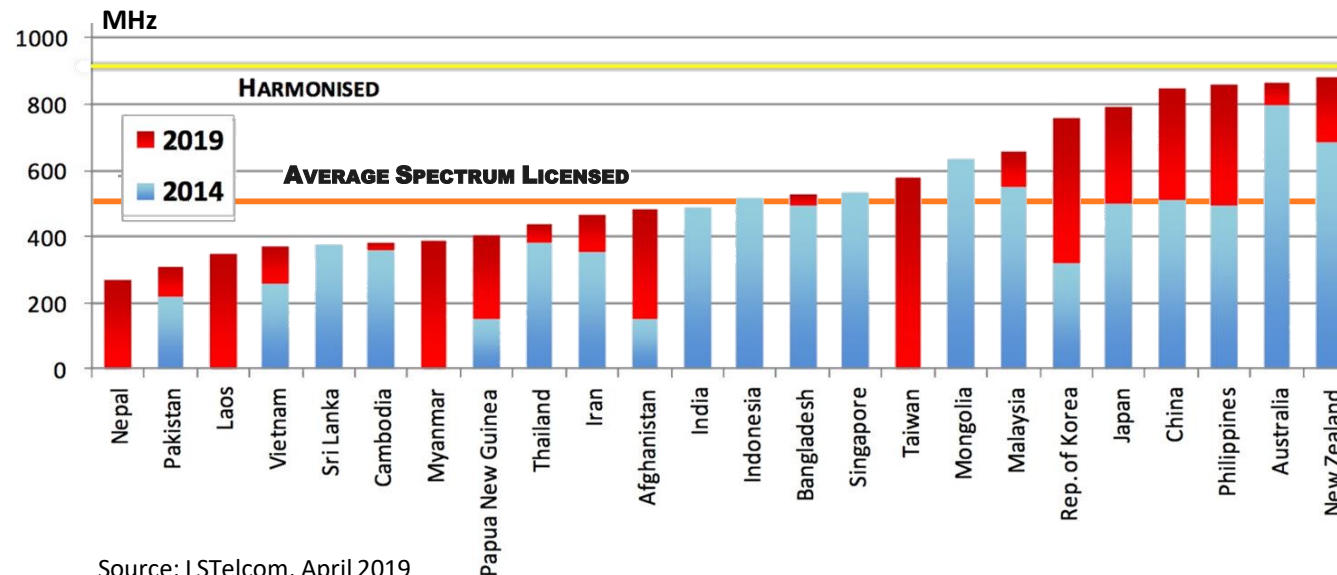Source: Bill Lan, Huawei Intelligence, 2020

Accelerate the assignment of sub-1GHz for better coverage

Spectrum licensed situation by region, 2019

	Region1 EU/EFTA	Region 1 ASMG	Region 1 Africa	Region 1 CIS/Balkans	Region 2	Region 3
Average spectrum licensed	757MHz	556MHz	477MHz	430MHz	426MHz	549MHz
Percentage of harmonized spectrum licensed	60%	52%	44%	40%	41%	60%
Amount of spectrum yet to be licensed	300-400MHz	500-600MHz	500-700MHz	600-700MHz	500-600MHz	300-500MHz

Total IMT spectrum allocation by country in Region 3

Source: LSTelcom, April 2019

- Only **40-60%** of spectrum harmonized for IMT usage has been licensed globally

- **300-700 MHz** of harmonized spectrum is yet to be licensed in each ITU region

- In region 3, **549MHz** out of 915MHz harmonized mobile bands has been licensed for IMT in 2019

- IMT spectrum licensed in most **South Asia** and **Southeast Asia** still below the region average

- **Sub-1GHz bands** (700/800/900MHz) are strategic important for its coverage **2.2x** larger than middle bands, better for removing coverage gap

- Policy on **dual sub-1GMHz bands** should put in place for better rural/indoor coverage against emergent event like pandemic

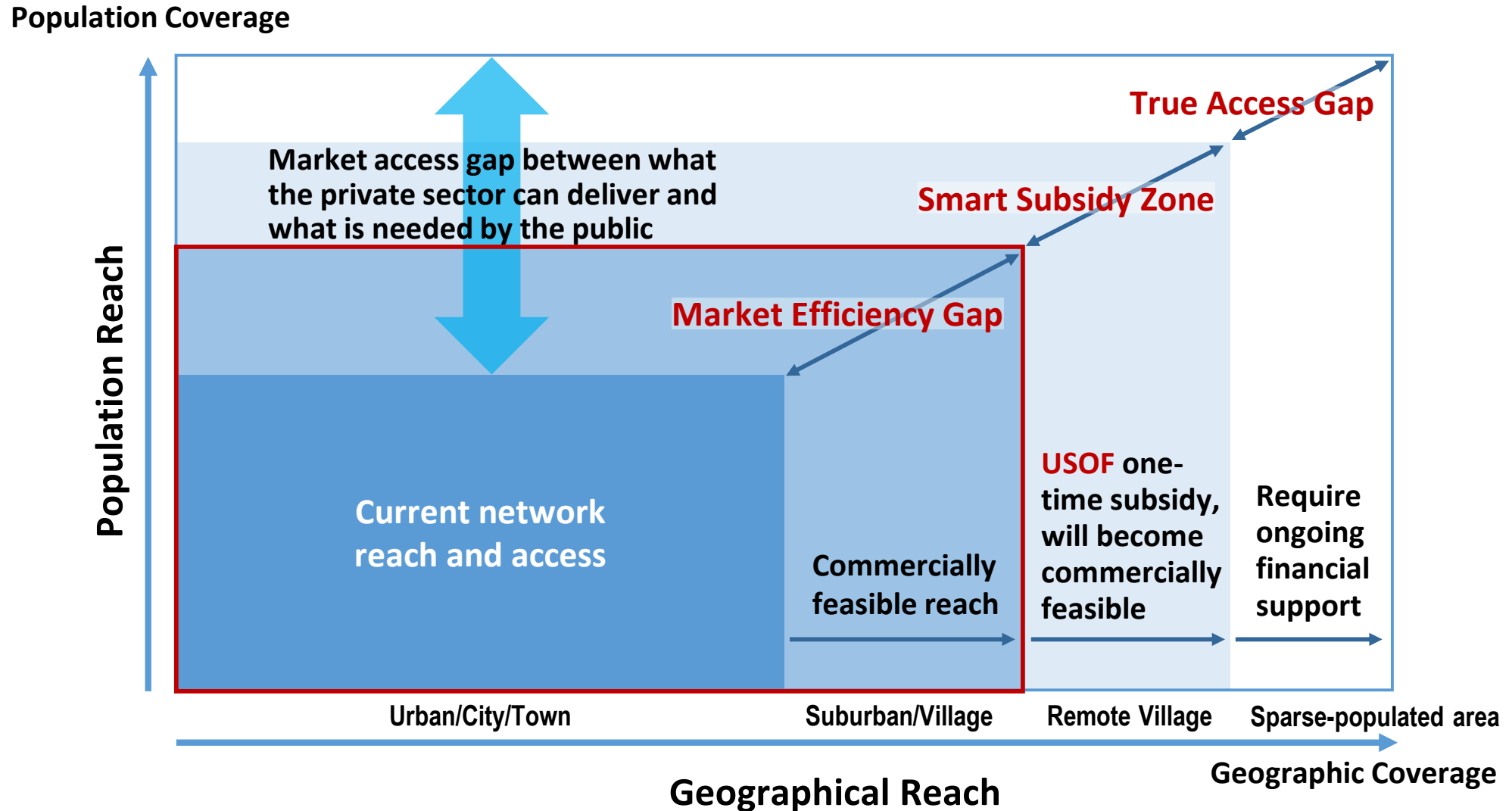- Imposing **technology neutrality** to encourage 900MHz refarming for LTE

Smart public funding upon diverse market access gaps

Population Coverage

Population Reach

Market access gap between what the private sector can deliver and what is needed by the public

True Access Gap

Smart Subsidy Zone

Market Efficiency Gap

Current network reach and access

Commercially feasible reach

USOF one-time subsidy, will become commercially feasible

Require ongoing financial support

Urban/City/Town   Suburban/Village   Remote Village   Sparse-populated area

Geographical Reach
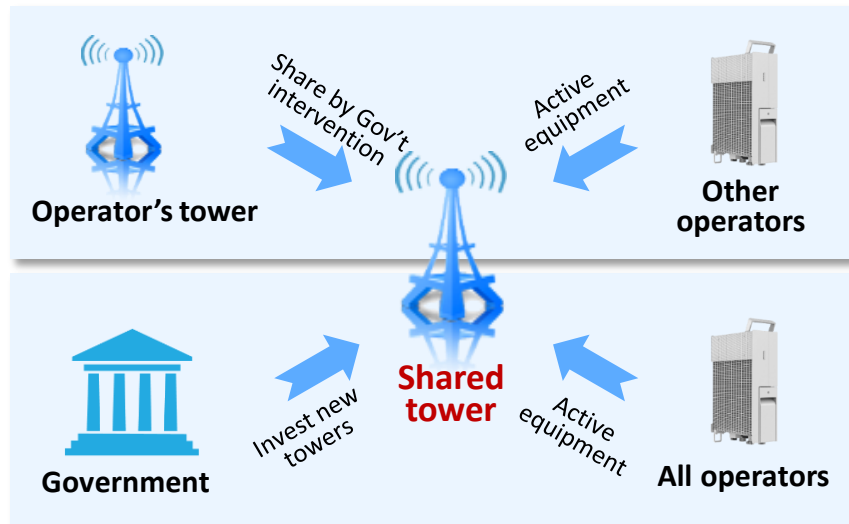
Geographic Coverage

Imposing government intervention on infrastructure sharing

Last mile connectivity via power infrastructure
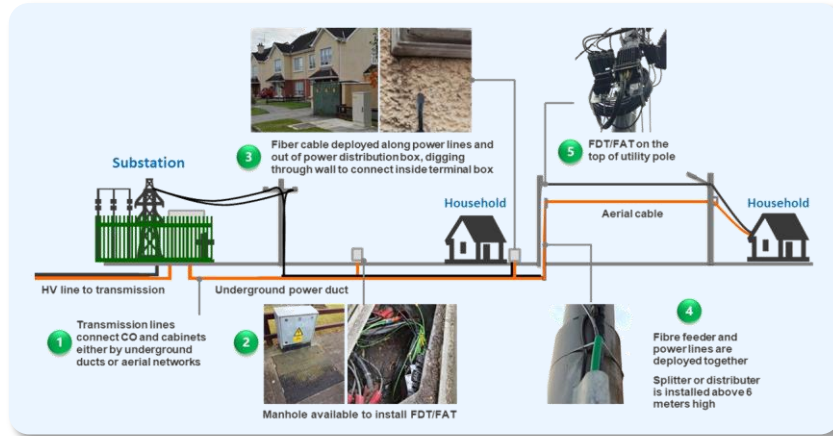
UK passive infrastructure sharing model

Share by Gov't intervention

Active equipment

Operator's tower

Other operators

Invest new towers

Active equipment

Shared tower

Government
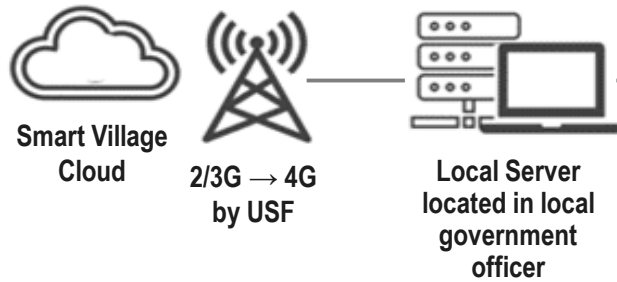
All operators

Source: Huawei Intelligence

- Government shall impose **infrastructure sharing obligation** on utility company and municipality for the free access of public facilities, e.g., electric pipeline, optical cable, street light pole and traffic structure for mobile network construction

- **Tower sharing** should be enforced by government intervention or regulatory incentives such as **public subsidy**, **spectrum fee reduction** to encourage sharing

- UK Ofcom mandates BT **open existing poles and ducts** to all operators for new fiber network deployment

- UK Ofcom also provides **spectrum fee reduction on 700MHz** in exchange of tower sharing of among operators

- **Public funding** on passive infrastructure in the white area are popular in rural NBN projects to provide FBB or MBB services

- Active infrastructure sharing such as RAM sharing has already piloted in several countries

Cooperation + innovation for meaningful, sustainable connectivity

Pilots cooperated by ITU, local government and industry

Last Mile Connectivity

- Smart Village Cloud
- 2/3G → 4G by USF
- Local Server located in local government officer
- MBB FWA WiFi

E-government portal offer identification, proclamation, public services and tax payment

E-learning solution for teachers, students and community members to improve literacy and e-literacy

Tablet for healthcare workers with pre-loaded **telemedicine** and decision support tools; pre-loaded healthcare apps on cellular phones

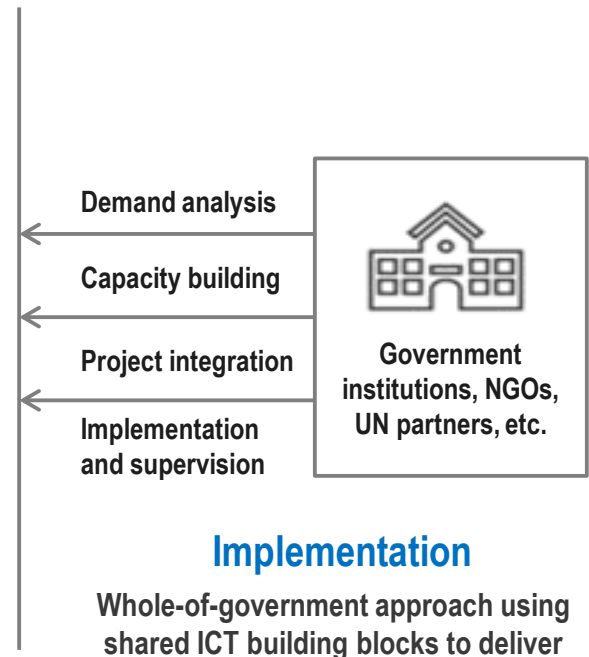**Mobile payment** with money transfer, overdraft and microloan functions to foster microenterprises

Community marketplace, an decentralized e-commerce platform allow villagers to share and sell foods, goods, transports to turn over surplus stock and capitalize individuals

Agriculture information platform to provide weather forecast, market price, pest prevention and professional advisory services to local farmers/dairy farmers

Access to other locally available applications, services and user-generated contents

Platform and Solutions

- Demand analysis
- Capacity building
- Project integration
- Implementation and supervision

Government institutions, NGOs, UN partners, etc.

Implementation

Whole-of-government approach using shared ICT building blocks to deliver

Bring digital to every person, home and organization
for a fully connected, intelligent world

Thank you

HUAWEI