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# **Economic Aspects of Spectrum Management: **An Indonesia Case Study****

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# Agenda

- 1 COUNTRY PROFILE : INDONESIA
- 2 BRTI & NATIONAL SPECTRUM MANAGEMENT
- 3 SUMMARY OF ICT MARKET IN INDONESIA
- 4 SPECTRUM MANAGEMENT CASE STUDY
- 5 LESSON LEARNED AND CHALLENGES

# COUNTRY PROFILE : INDONESIA



The world's largest archipelago



Scattered rural areas



Difficult landscape

- More than 17,500 islands
- Spanning the length of 3,977 miles
- Total area 1.9 million square miles

Source: UNDP

Population\*: 248.8 million

34 provinces\*  
511 districts/city\*  
80,714 villages\*

# THE ARCHIPELAGO ECONOMY : UNLEASHING INDONESIA'S POTENTIAL

## *Indonesia today ...*

**16th-largest** economy in the world

**45 million** members of the consuming class

**53%** of the population in cities producing **74%** of GDP

**55 million** skilled workers in the Indonesian economy

**\$0.5 trillion** market opportunity in consumer services, agriculture and fisheries, resources, and education



## *... and in 2030*

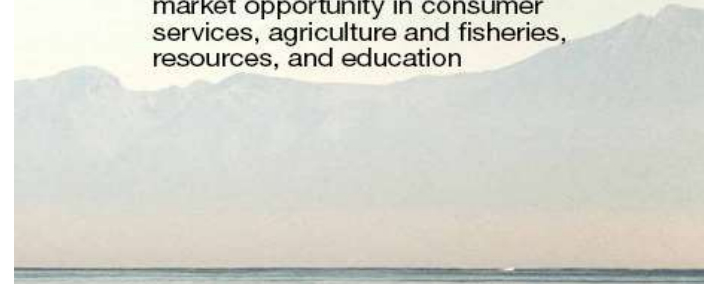
**7th-largest** economy in the world

**135 million** members of the consuming class

**71%** of the population in cities producing **86%** of GDP

**113 million** skilled workers needed

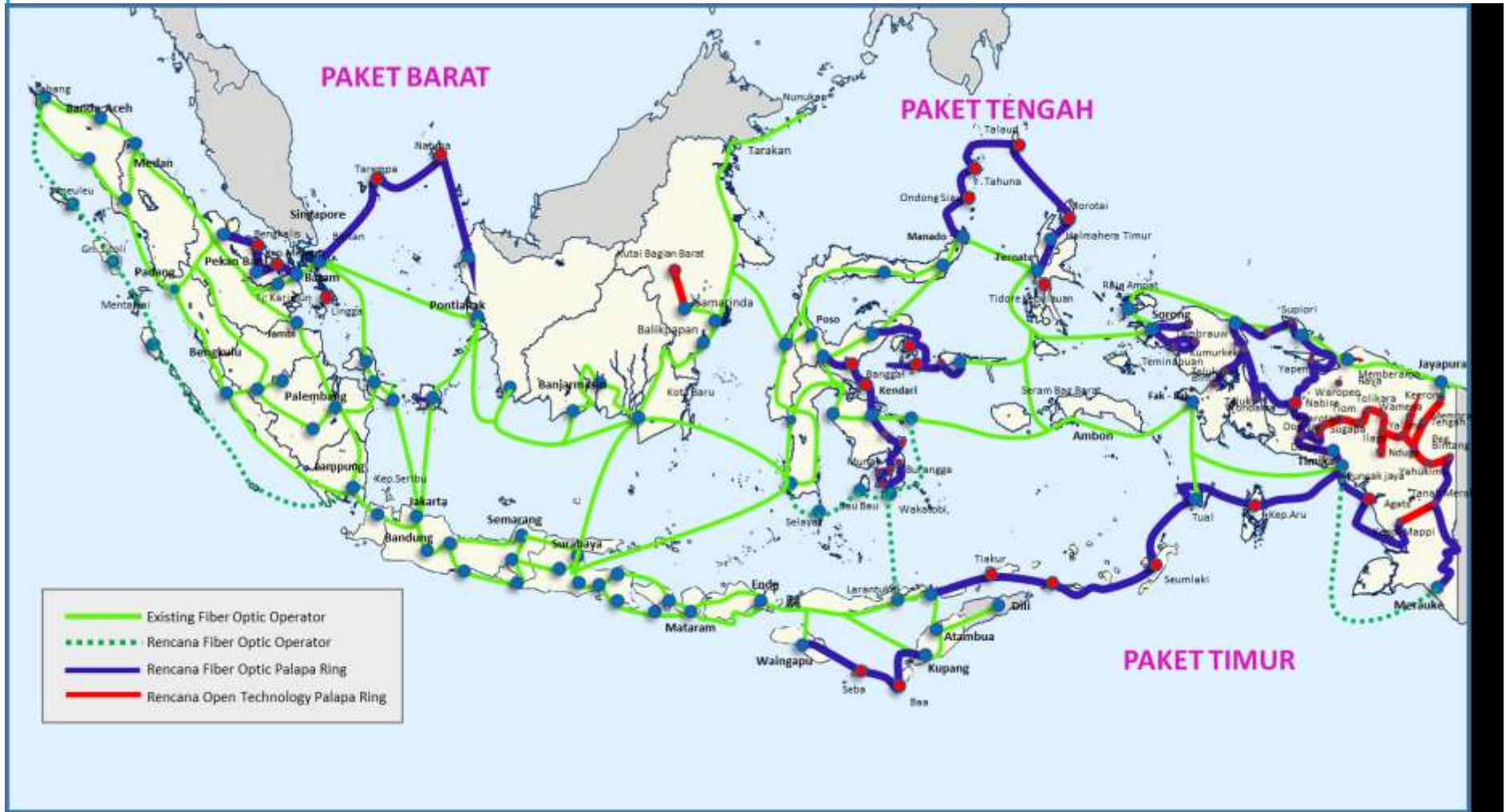
**\$1.8 trillion** market opportunity in consumer services, agriculture and fisheries, resources, and education



Source: McKinsey Global Institute, September 2012

# ICT INFRASTRUCTURE PROFILE : NATIONAL BACKBONE

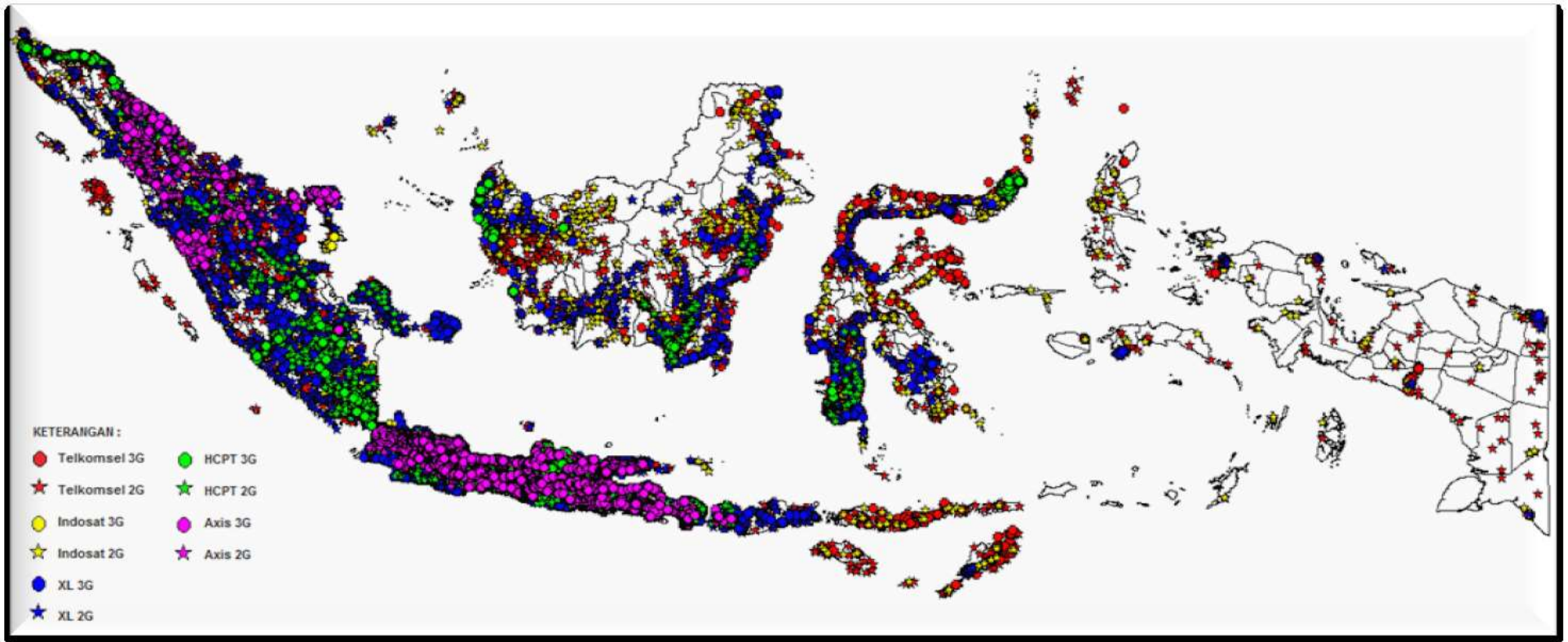
## FO Backbone



FO backbone covers more than 72% of districts. Our National FO systems (PALAPA RING) will be ready for service in 2018.

# ICT INFRASTRUCTURE PROFILE : RADIO ACCESS NETWORK

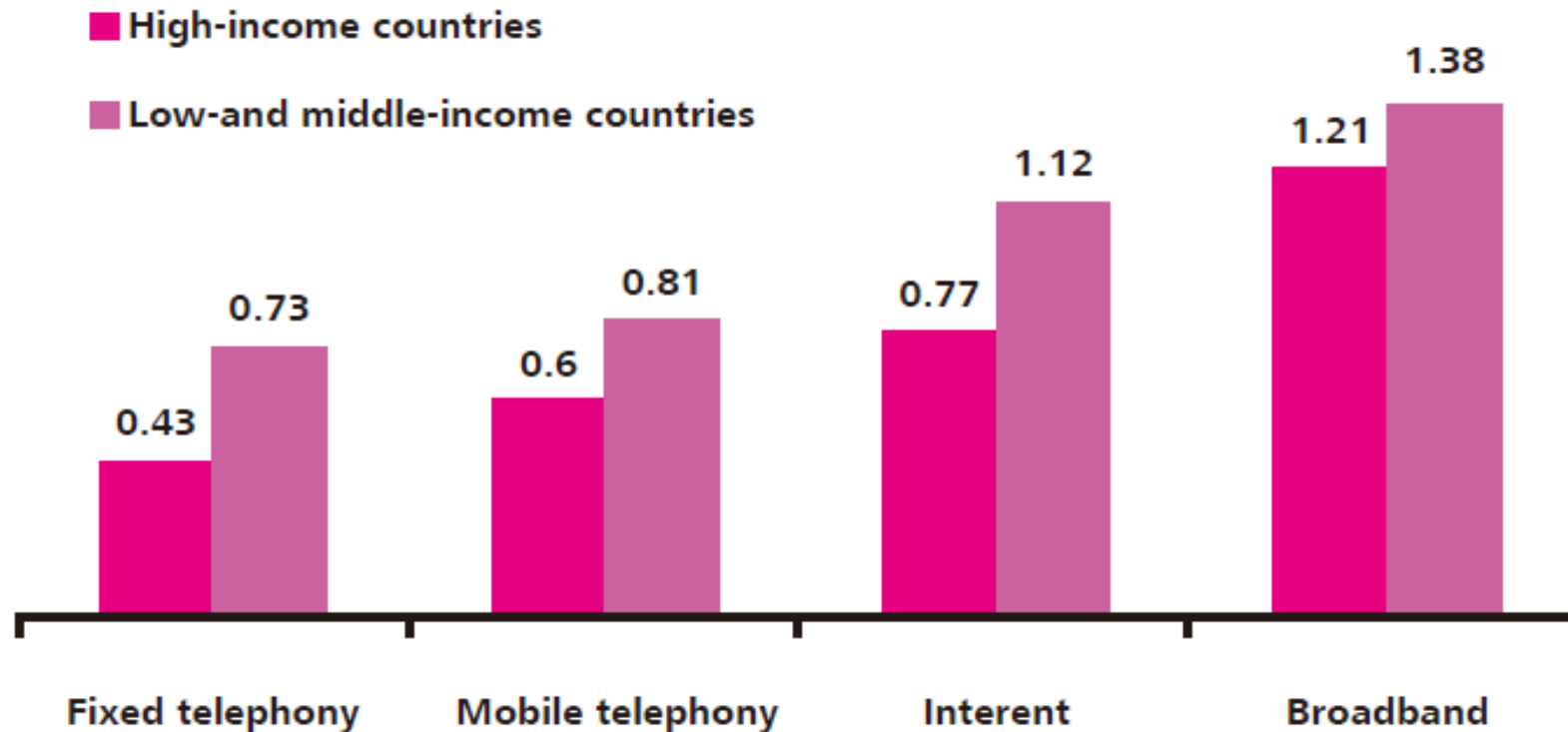
## Cellular BTS Coverage



2G , 3G and 4G BTS cover all provinces providing more than 90% coverage of cellular.

# SOCIO-ECONOMIC OF BROADBAND

*Exhibit 6: Growth impact of telecommunications  
(GDP percentage point increase due to 10 percentage-point increase in penetration)*



Source: World Bank 2010

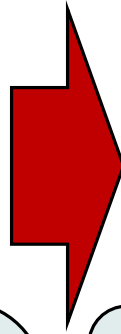
# INDONESIA BROADBAND PLAN TARGETS



2013

Fixed Broadband:  
15% HH (1Mbps) and 5% population;

Mobile Broadband:  
12% population (512 kbps)



2019

Urban:  
Fixed Broadband: 71% HH (20Mbps);  
Mobile Broadband: 100% pop (1 Mbps)

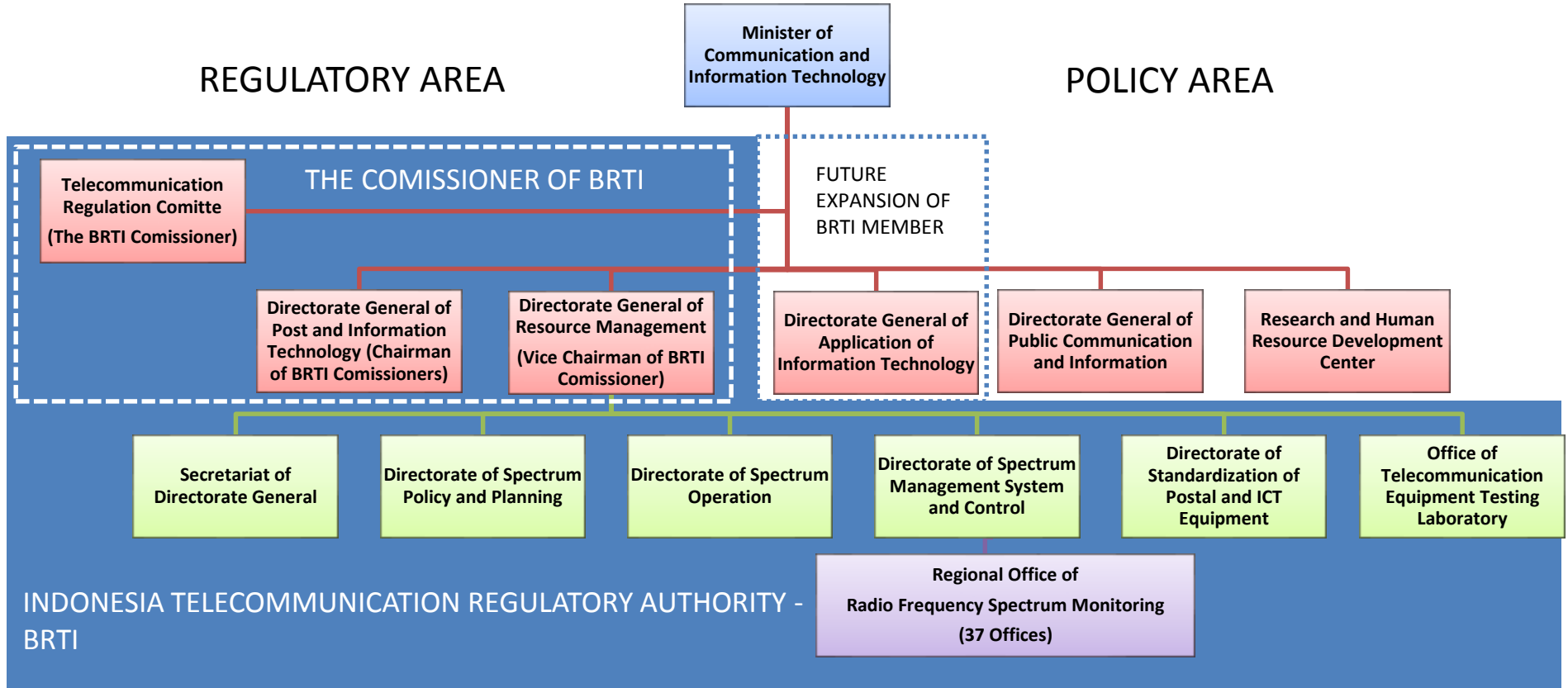
Rural:  
Fixed Broadband: 49% HH (10Mbps);  
Mobile Broadband: 52% pop (1 Mbps)

## Utilization:







- Broadband service price: max 5% of average monthly income
- Priority Sectors: e-Government; e-Education; e-Health; e-Logistic, e-Procurement



# BRTI & NATIONAL SPECTRUM MANAGEMENT ORGANIZATION STRUCTURE

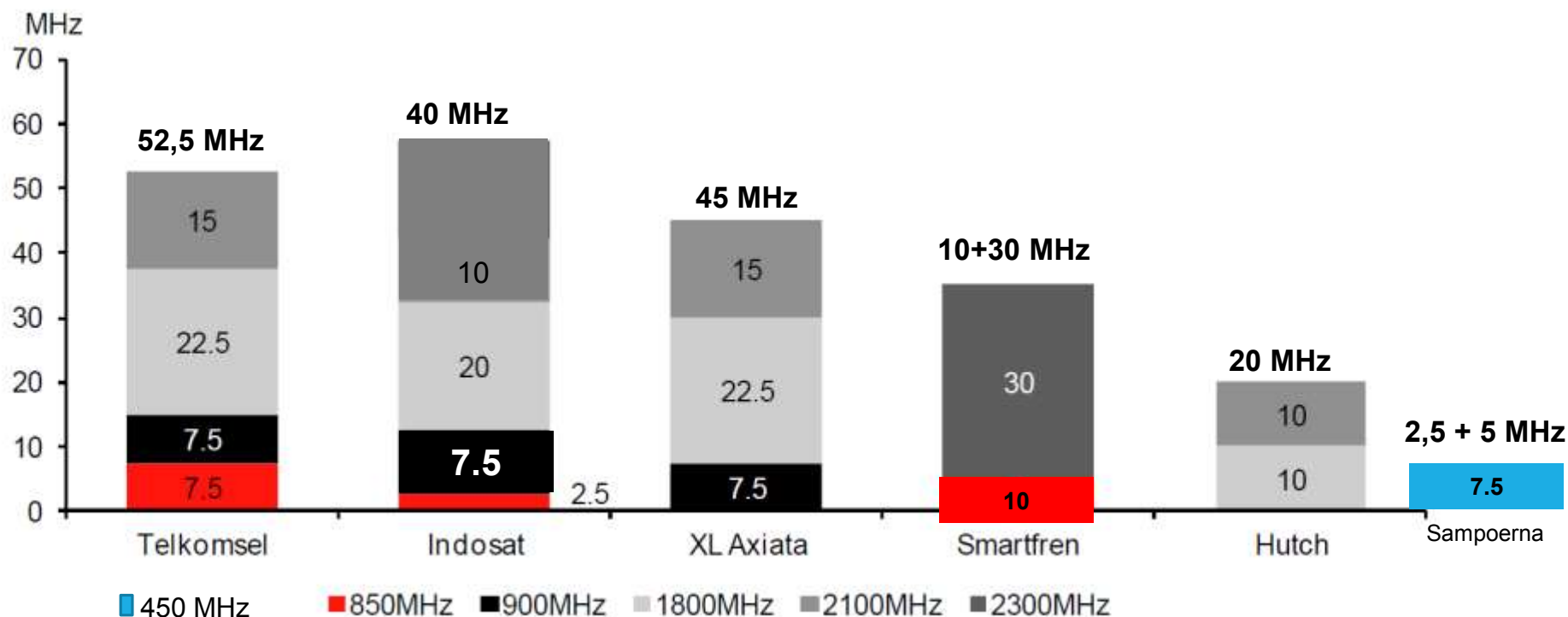


# INDONESIA CELLULAR PROVIDER (Q3/2016)

OPERATOR	SUBSCRIBER	RADIO ACCESS NETWORK	TECHNOLOGY
 <b>TELKOMSEL</b> <small>by Telkom Indonesia</small>	118.140.245	850/900/1800/2100 (52,5 MHz)	2G/3G/4G
	50.846.707	850/900/1800/2100 MHz (40 MHz)	2G/3G/4G
	45.000.000	900/1800/2100 MHz (45 MHz)	2G/3G/4G
	25.102.343	1800/2100 MHz (20 MHz)	2G/3G/4G
	2.438.843	850/2300 MHz (30 MHz)	2G/3G/4G
	52.402	450 MHz (7,5 MHz)	2G/4G

# IMT SPECTRUM USED IN INDONESIA (195 MHz)

Indonesia's current spectrum allocations for GSM players

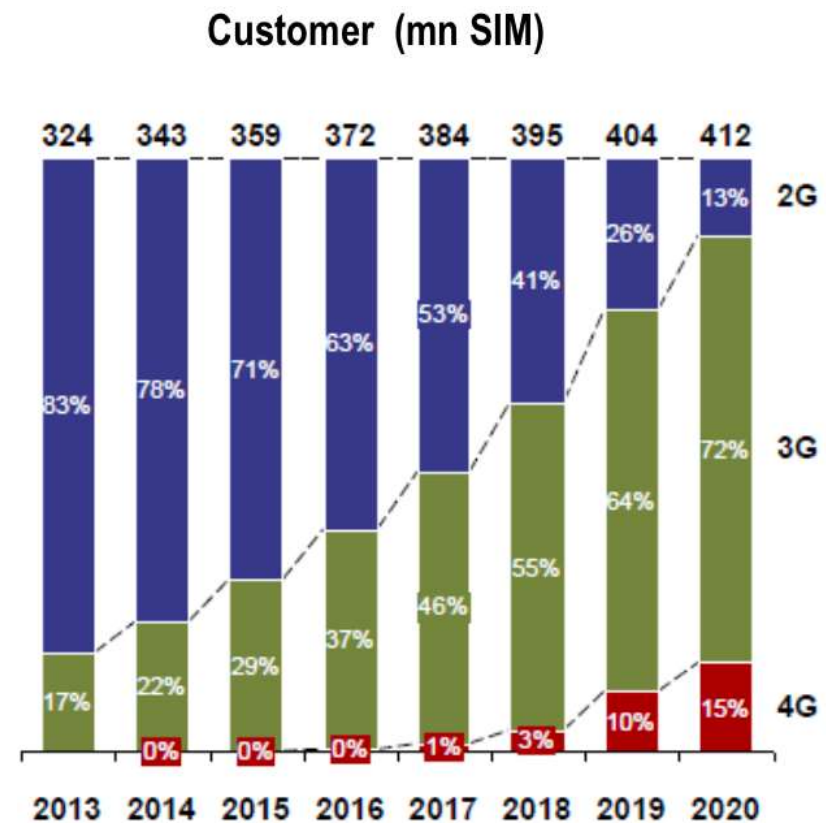
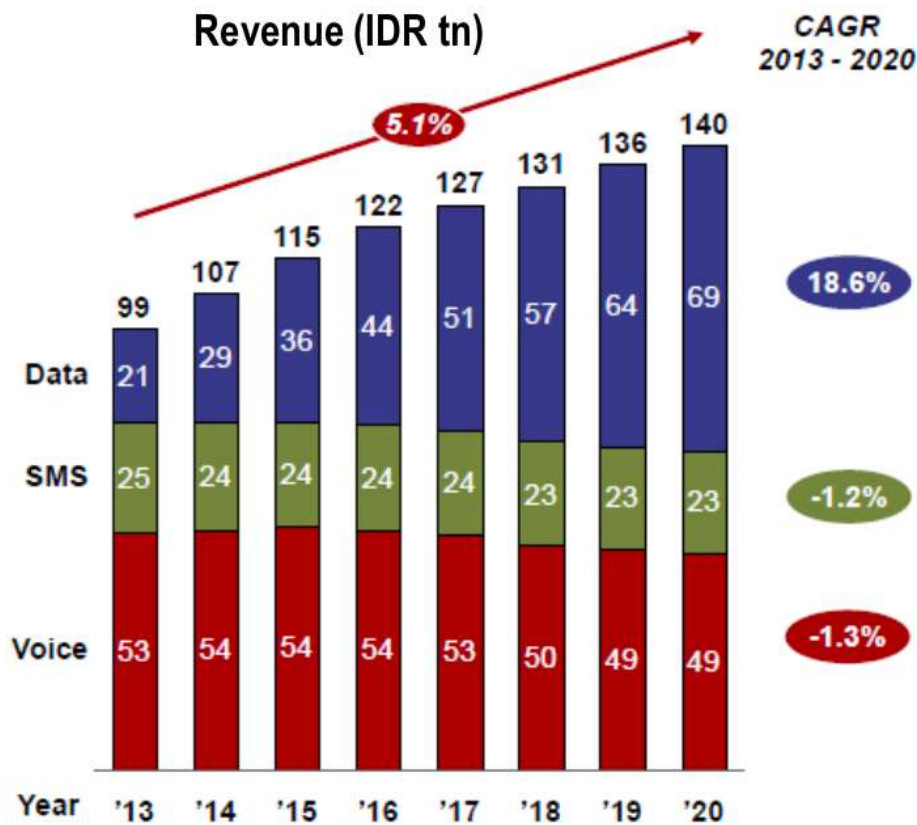


Source: Company data, Macquarie Research, October 2016

**AVAILABLE FOR 2016 AUCTION : 2x10 MHz (FDD 2100) + 1x30 MHz (TDD 2300)**

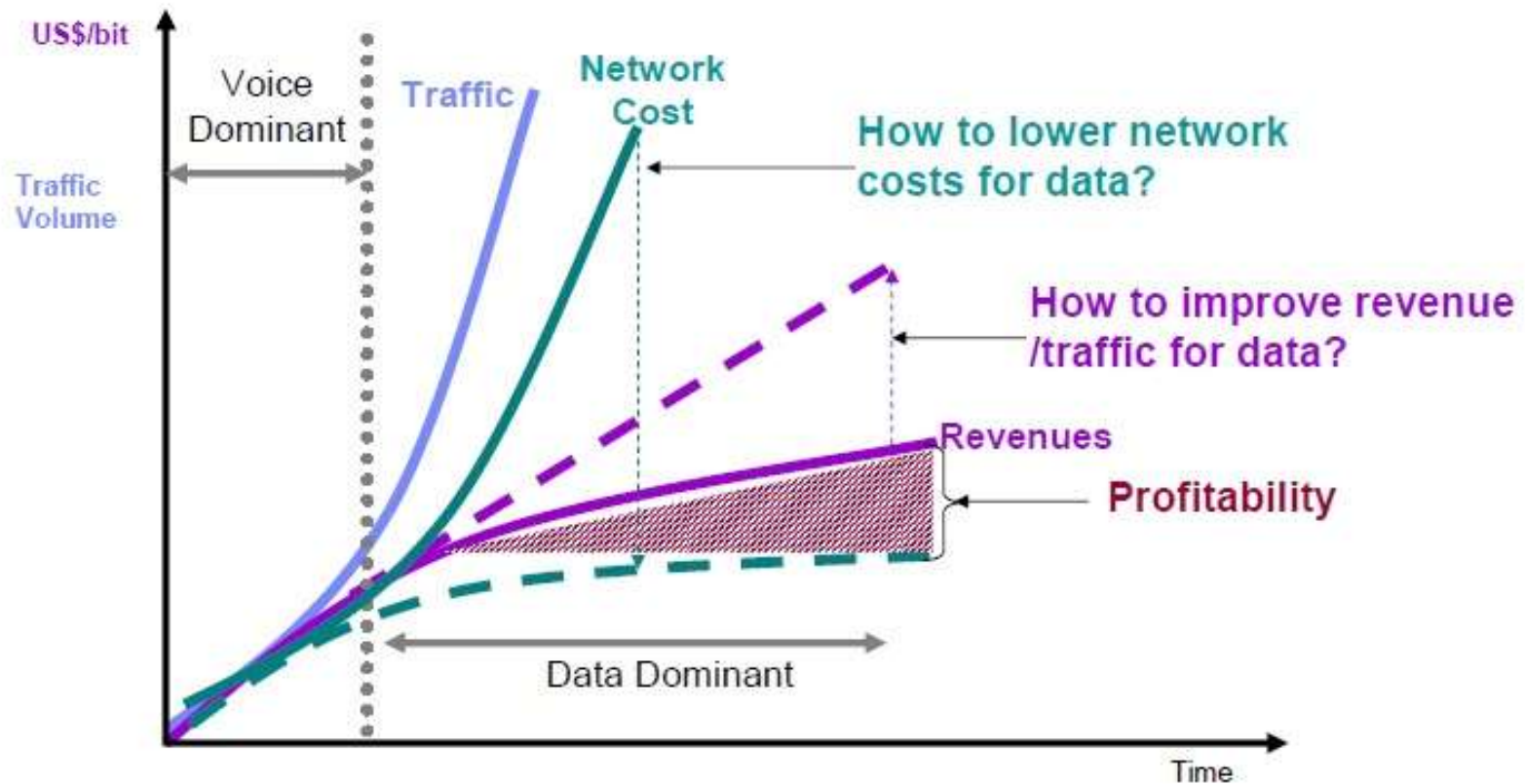
# INDONESIA CELLULAR MARKET

will grow to IDR 140 Trillion by 2020, fuelled by data revenue growth



# INDONESIA CELLULAR MARKET

## The Scissor Effect



Source: Nokia-Siemens; IBM Institute for Business Value (IBV) Analysis



# **SPECTRUM MANAGEMENT FOR MOBILE BROADBAND ACCELERATION**

# OUR REGULATORY MAIN STAKEHOLDER

## GOVERNMENT

1. TELECOMMUNICATION PENETRATION
2. CYBER SOVEREIGNTY
3. ECONOMIC GROWTH
4. NATIONAL COMPETITIVE ADVANTAGE



INDONESIA TELECOM REGULATORY AUTHORITY

## INDUSTRY

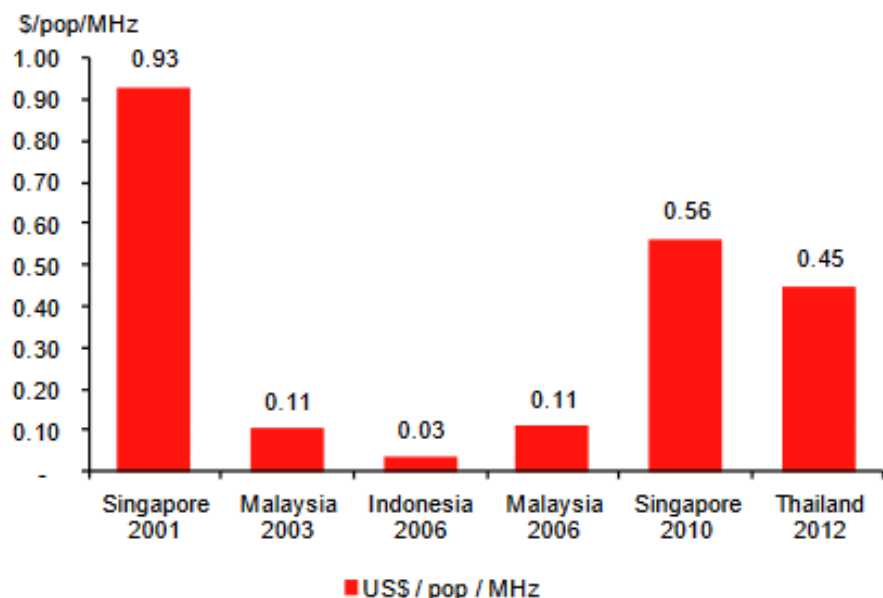
1. HEALTHY COMPETITION
2. CLEAR & FAIR REGULATION
3. BUSINESS SUSTAINABILITY

## PEOPLE

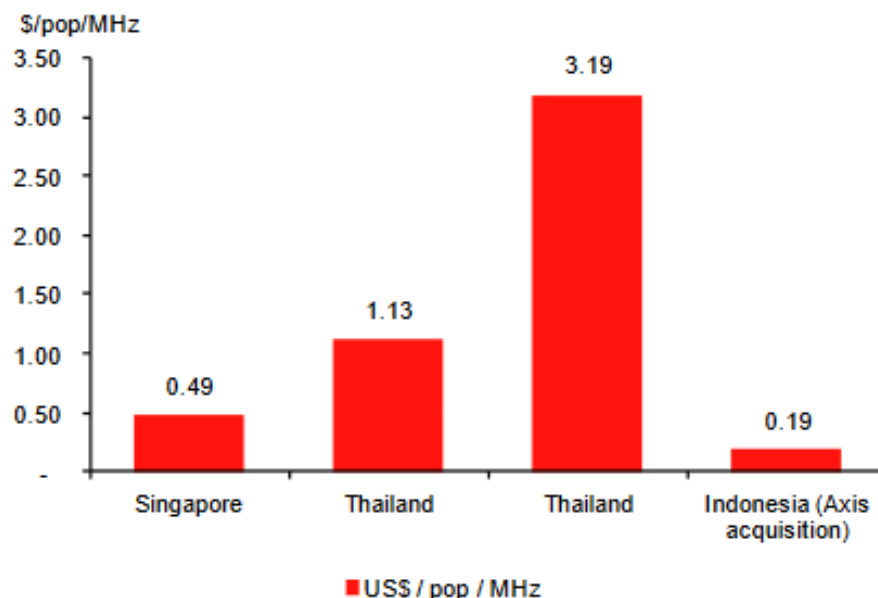
1. CUSTOMER PROTECTION
2. CUSTOMER PRIVACY
3. DATA PROTECTION & DATA PRIVACY

# SPECTRUM PRICING

**Fig 5 Price of 2100MHz auctions across ASEAN**



**Fig 6 Price of other spectrum auctions across ASEAN**



**Fig 7 Previous 2100MHz spectrum auctions around ASEAN**

Country	Total allocation (MHz)	Year	Total price (US\$m)	Price/5MHz (US\$ mn)	Population	US\$ / pop / MHz
Singapore	15	2001	57.8	19.3	4,138,000	0.93
Malaysia	15	2003	39.5	13.2	24,890,000	0.11
Indonesia	15	2006	113.2	37.7	228,000,000	0.03
Malaysia	5	2006	14.6	14.6	26,330,000	0.11
Singapore	5	2010	14.3	14.3	5,077,000	0.56
Thailand	45	2012	1,342.9	149.2	66,790,000	0.45

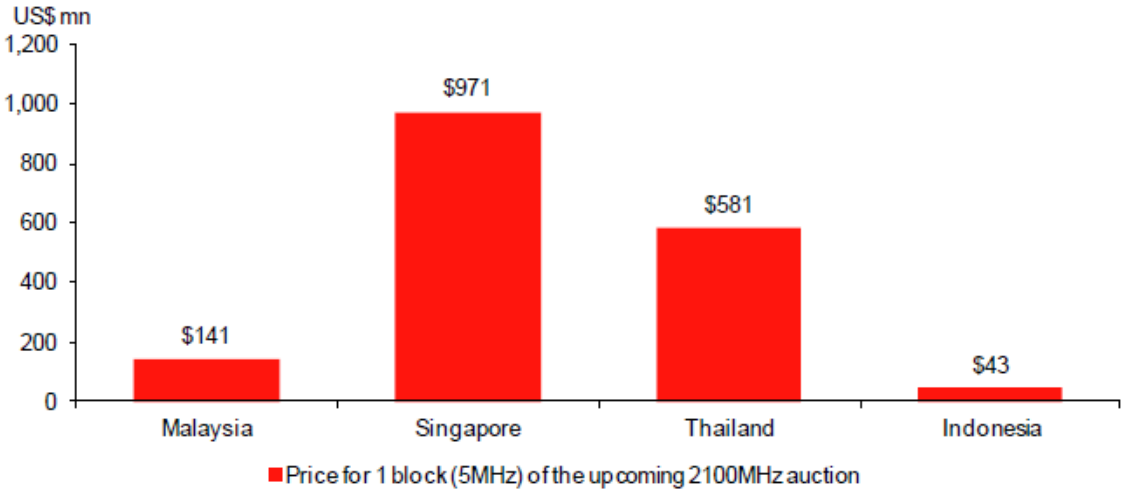
Currency exchange based on time of auction

Source: Company data, Macquarie Research, October 2016

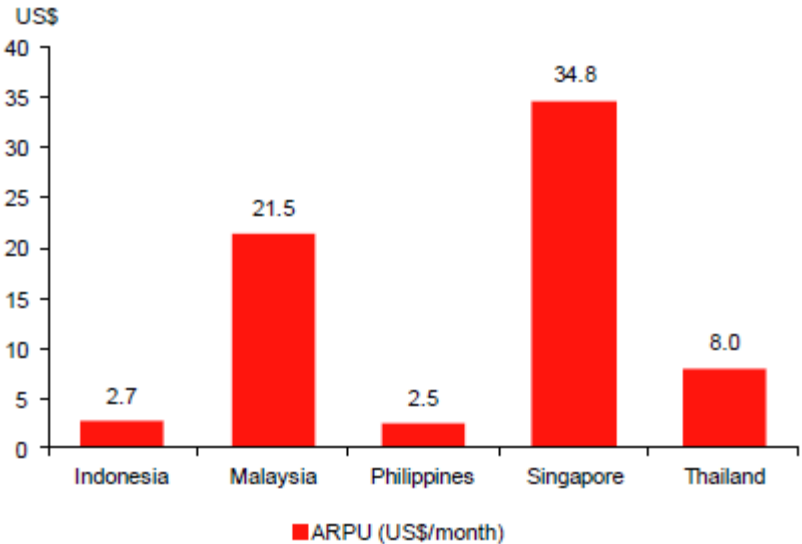


# SPECTRUM PRICING

Fig 2 Est. spectrum price based on 2100MHz auction comps across ASEAN

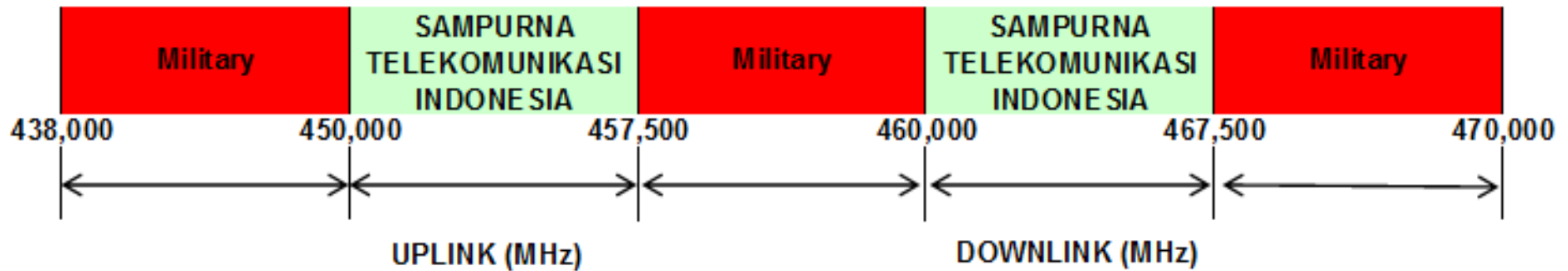


ARPU across ASEAN as of mid-2016

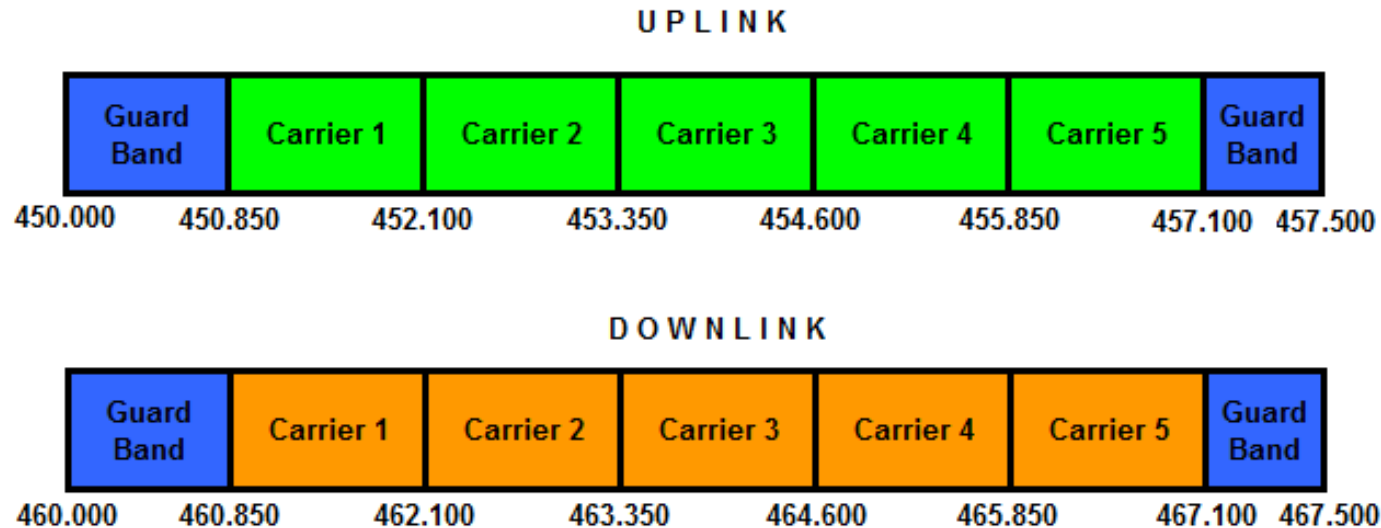


Source: Company data, Macquarie Research, October 2016

# MANAGING SPECTRUM OF 450 MHZ

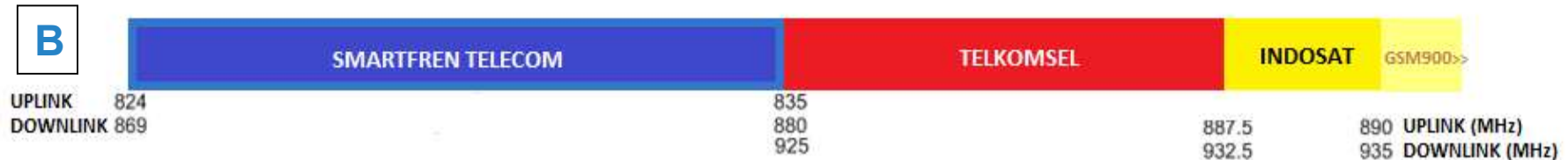
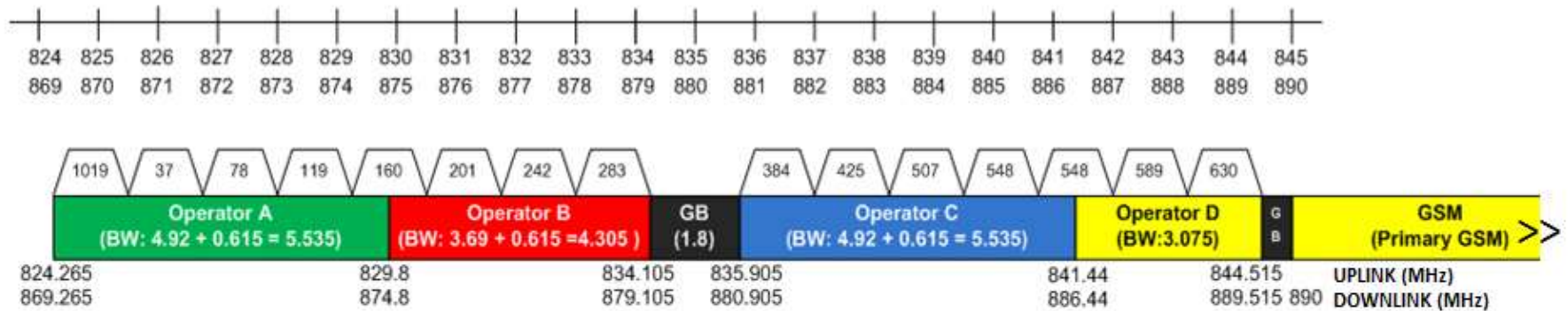


## Channel Arrangement



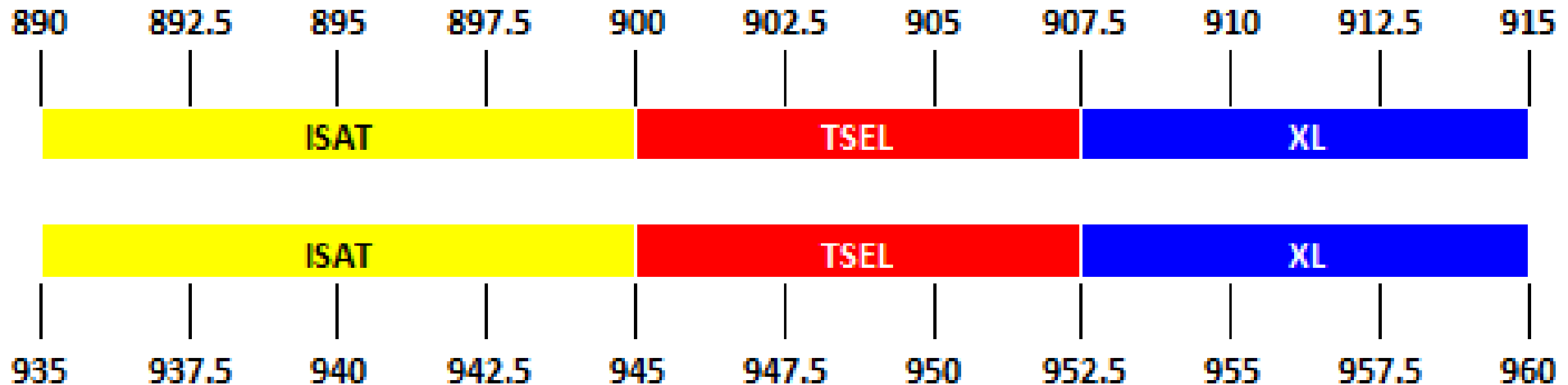
# MANAGING SPECTRUM OF 800 MHZ + E-GSM

## CASE STUDY : RE-FARMING & RE-PURPOSING



# MANAGING SPECTRUM OF 900 MHZ

## CASE STUDY : NEUTRAL TECHNOLOGY



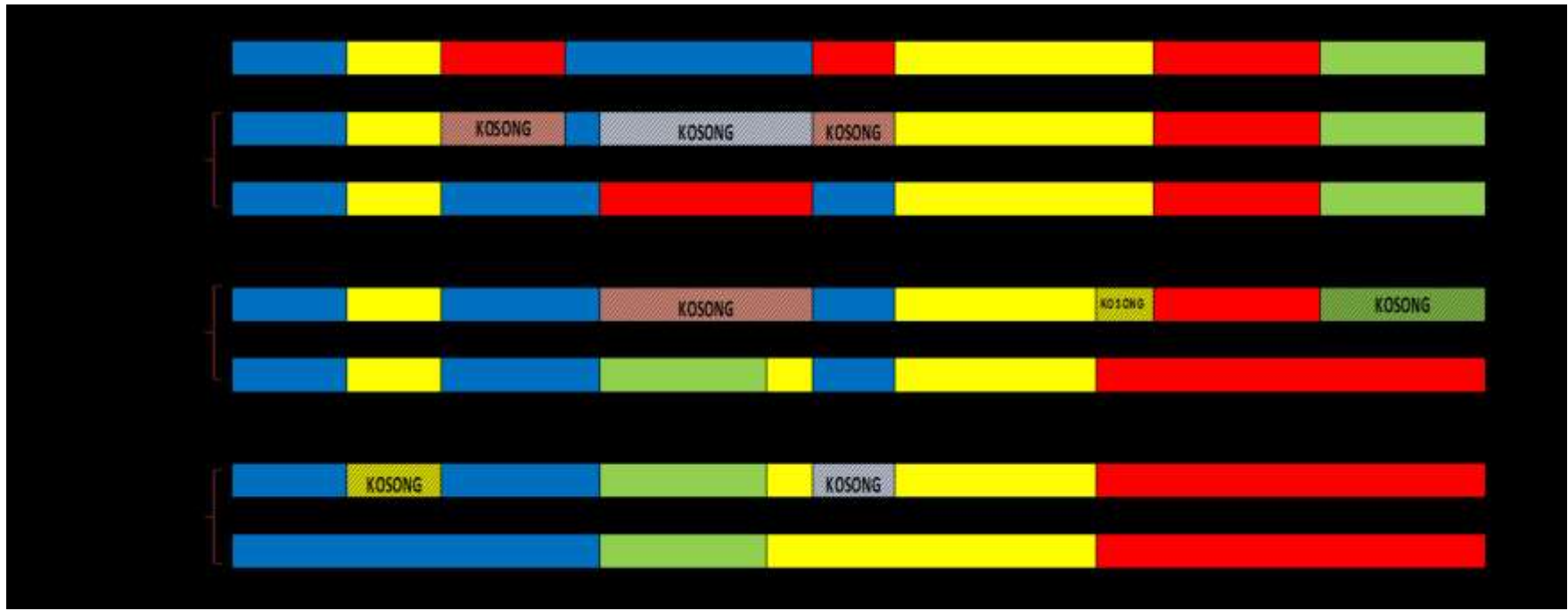
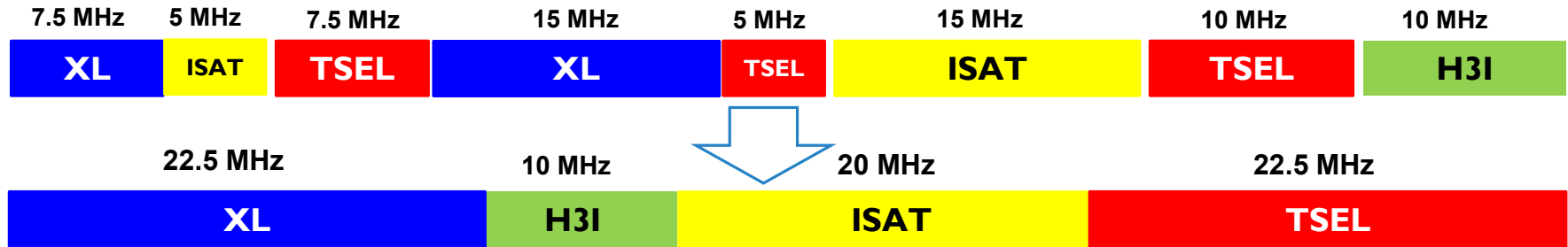
Technology Evolution Path (All Operator are already contiguous) :

GSM/EDGE → UMTS → HSPA → HSPA+ → **LTE**

**All Operator ready to implement UMTS / 3G 900**

# MANAGING SPECTRUM OF 1800 MHZ

## CASE STUDY : RE-FARMING



# MANAGING SPECTRUM OF 2100 MHZ

## CASE STUDY : RE-FARMING

Sebelum Penataan Menyeluruh



1920MHz (UL)

(UL) 1980MHz

2110MHz (DL)

(DL) 2170MHz



Setelah Penataan Menyeluruh



1920MHz (UL)

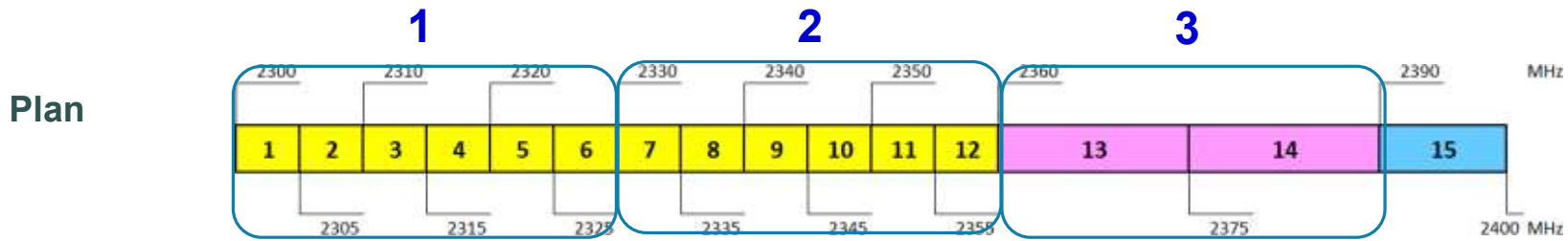
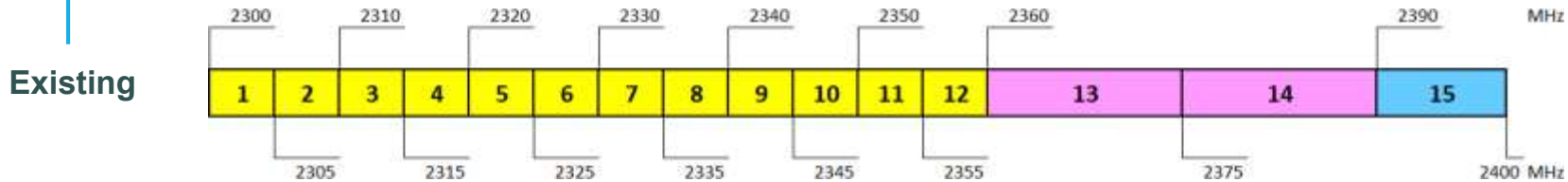
(UL) 1980MHz

2110MHz (DL)

(DL) 2170MHz

# MANAGING SPECTRUM 2300 MHz

## CASE STUDY : CONSOLIDATION



Spectrum auction at December 2016 (30 MHz)

Allocate to Smartfren (30 MHz) as compensation for migration from PCS1900 & swap for CDMA 850 MHz

- Regional BWA endorse for the consolidation of mobile national coverage (30 MHz)

**OUR NEXT CHALLENGE**  
**TO FULFILL SPECTRUM SCARCITY**



# RE-PURPOSING 2,6 GHZ ?



# DIGITAL DIVIDEN 700 MHZ (2018-2019)

## ANALOG TELEVISION ERA

**328 MHz**

478 ← ----- → 806 MHz



BROADCASTING DIGITALIZATION (ASO)

## DIGITAL TELEVISION ERA



478 526 ← ----- → 694 806 MHz

**192 MHz**

**112 MHz**

There is 112 MHz (694 – 806 MHz) Digital Dividend available, or 2 x 45 MHz FDD can use to accelerate *mobile broadband in nation*

# SPECTRUM SHARING POLICY

- Areas with high business potential
- Heavy competition between CSPs
- Service and performance differentiation needed
- Full control of own network assets
- Base method for network consolidation

- Areas with moderate business potential
- Competition between CSPs
- Partial control of network assets

- Areas with low business potential
- Possibly regulatory coverage requirements

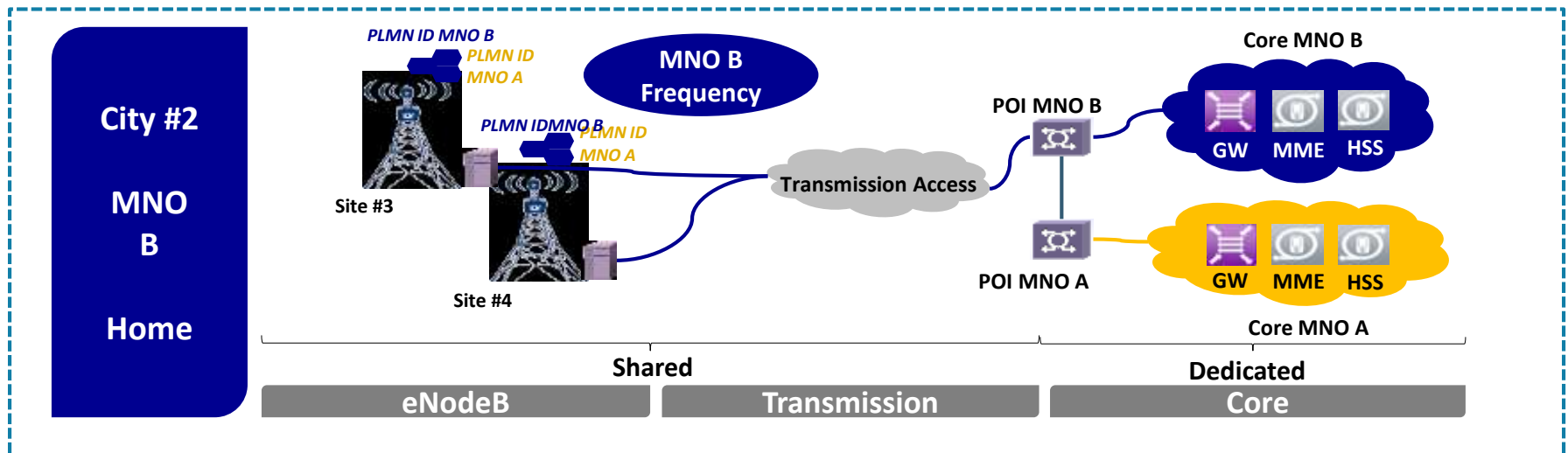
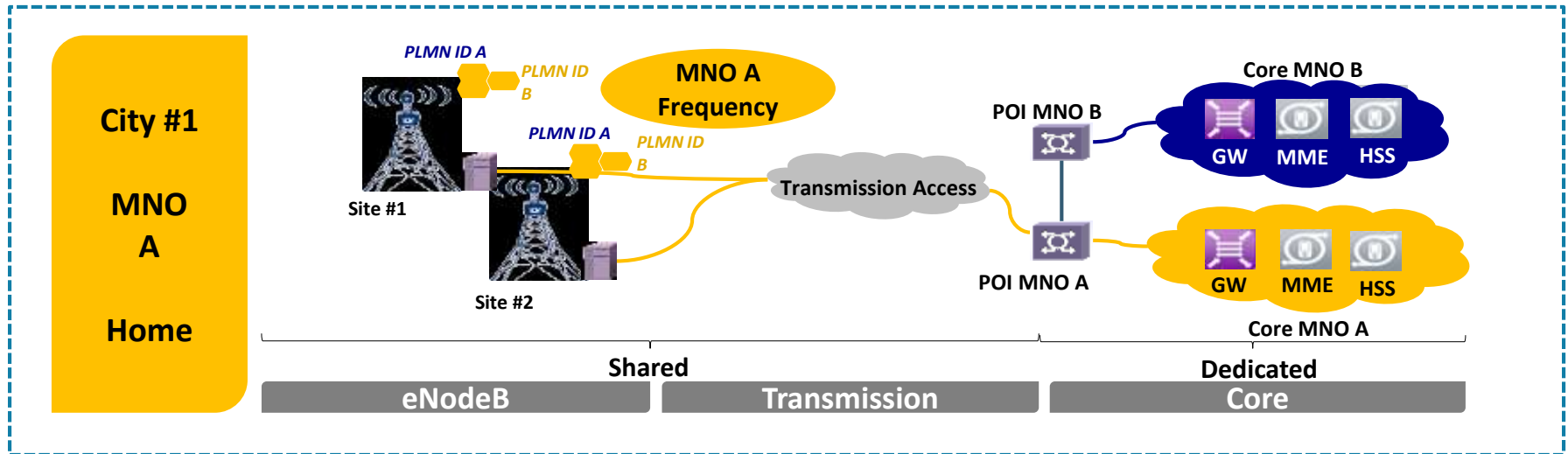
**Active RAN Sharing**

**Roaming Based Sharing**

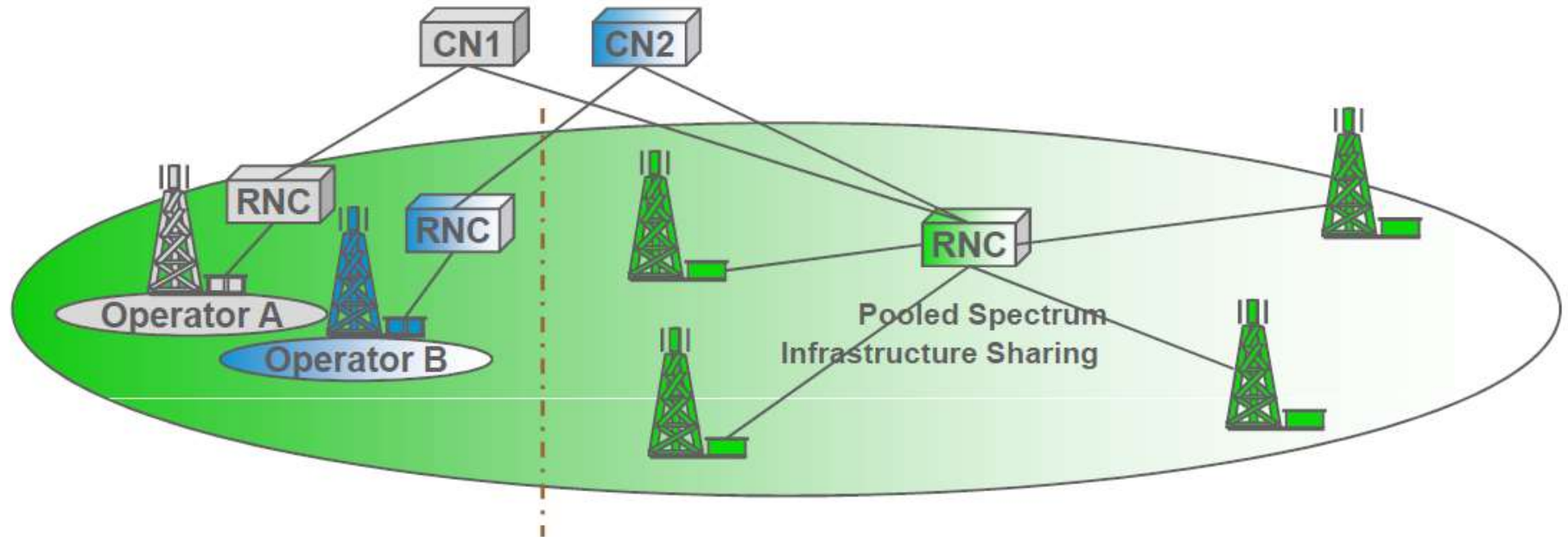
**Passive RAN / Site Based Sharing**



# LTE RAN SHARING WITH MOCN SPECTRUM SHARING



# The Way Forward : Hybrid Model for Indonesia Case



## URBAN :

- High Populated Area
- PASSIVE SHARING - MNO build their own network to get more **CAPACITY**

## SUB-URBAN / RURAL :

- Less Populated Area
- ACTIVE SHARING – 4G/3G MOCN & 2G RAN Sharing for **MORE EFFICIENT** Network Roll-out and better **COVERAGE**

# The Way Forward :

## Trend of Regulation Flexibility

- 1. Technology Flexibility** : Neutral Technology
- 2. Infrastructure Flexibility** : Network Sharing
- 3. Coverage Area Flexibility** : National Roaming
- 4. Spectrum Flexibility** : Spectrum Sharing/Trading
- 5. Operations Flexibility** : MVNO, Managed Services ?

# LESSON LEARNED & RECOMENDATION

- 1 SPECTRUM SCARCITY IS HERE, NETRAL TECHNOLOGY – NETRAL SERVICES ?
- 2 SPECTRUM FLEXIBILITY IS INEVITABLE
- 3 COLLABORATIVE REGULATION (5.0) IS NEEDED
- 4 KEY SUCCESS FACTOR : MULTISTAKEHOLDER APPROACH



KEMENTERIAN KOMUNIKASI DAN INFORMATIKA  
REPUBLIK INDONESIA  
*Menuju Masyarakat Informasi Indonesia*



*Twenty years from now you will be more disappointed by the things you didn't do than by the ones you did do. So sail away from the safe harbour. Catch the trade winds in your sails. Explore. Dream. Discover.*

*- Mark Twain*