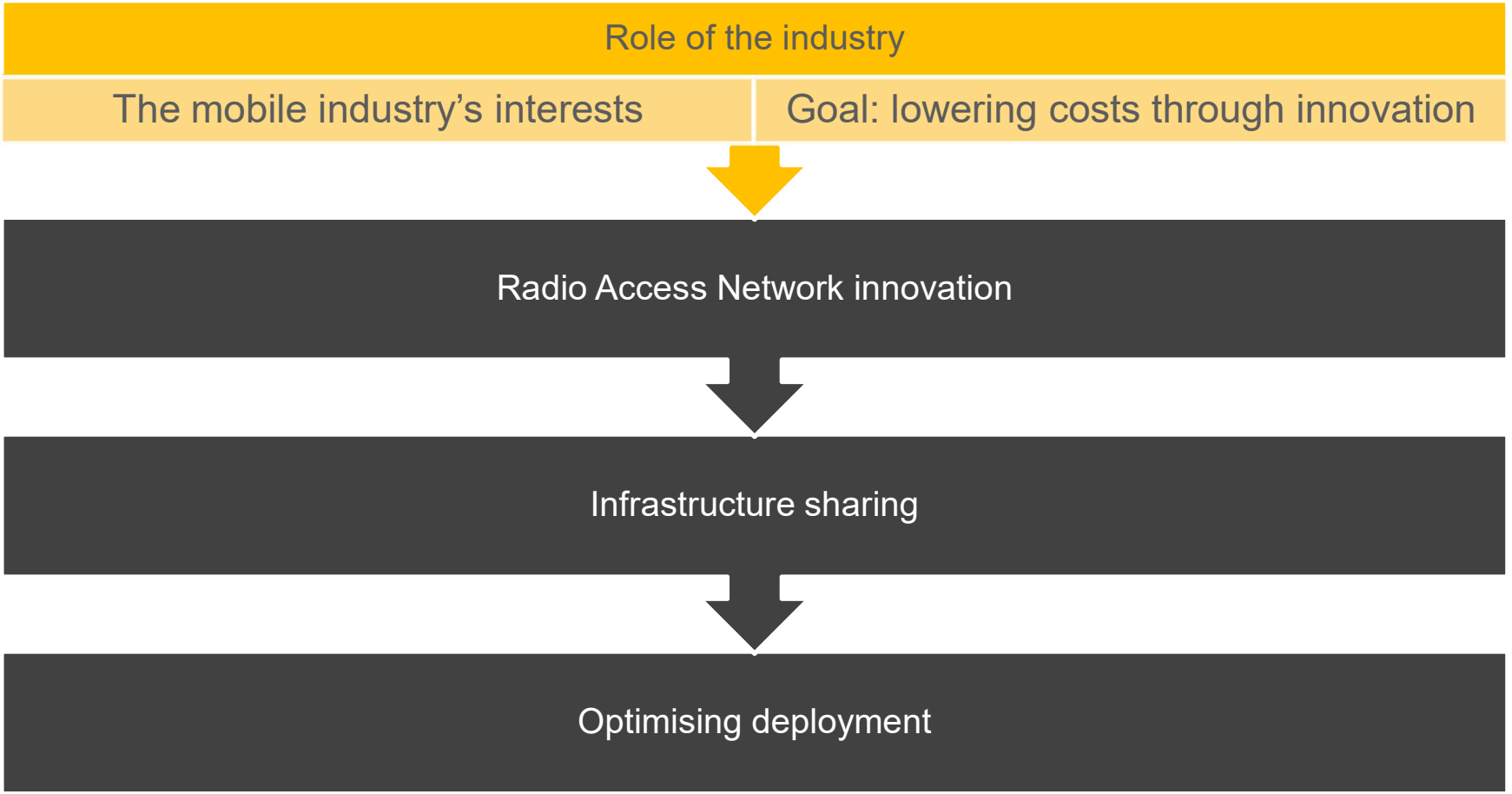
GSMA Capacity Building

2

SESSION 2

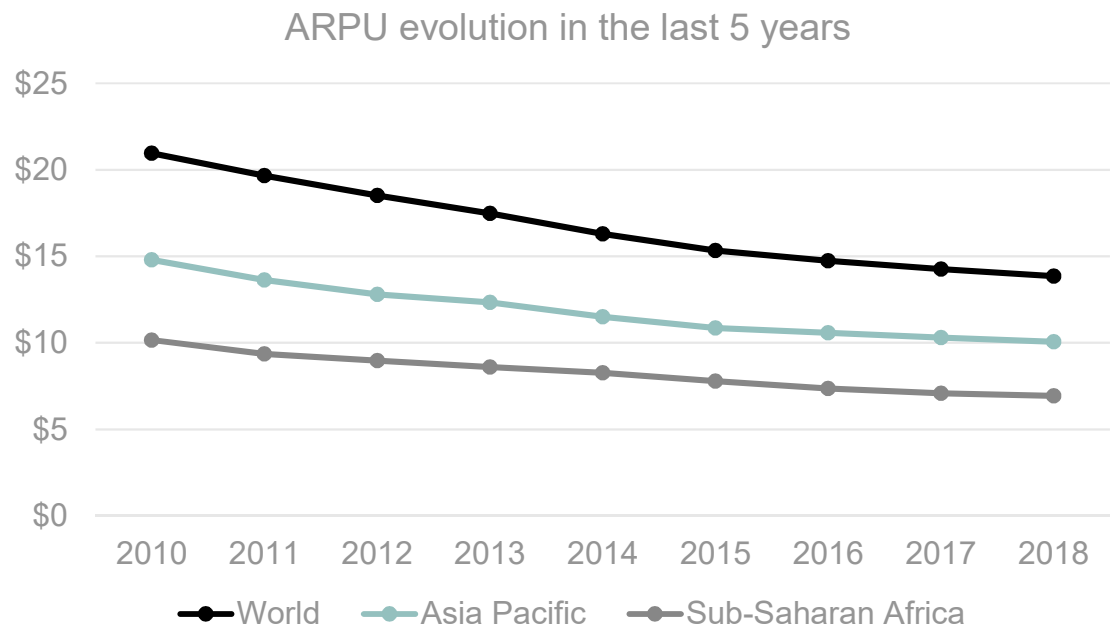
Closing the gap: the role of the industry

Role of the industry



The industry has an interest in extending coverage to unlock growth opportunities

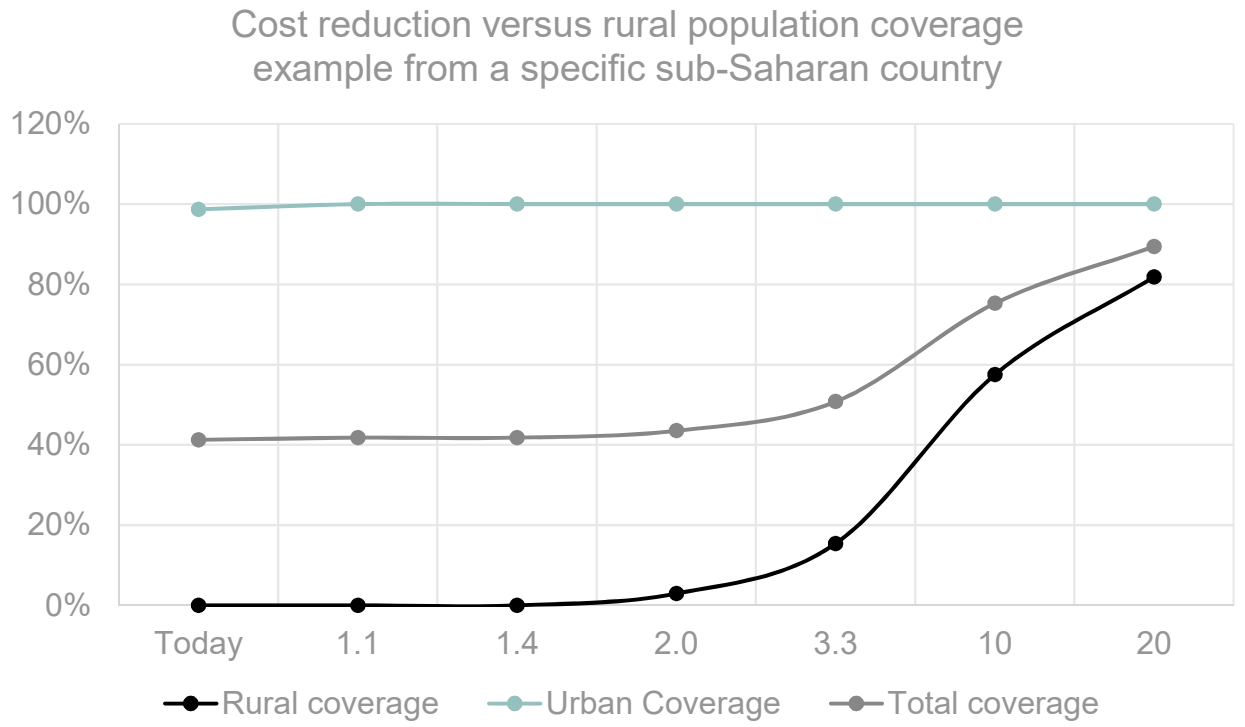
- Decreasing average revenue per user (ARPU) puts pressure on operator revenues
- Increasing coverage is key for operators to unlock revenue growth



*GSMA Intelligence 2017

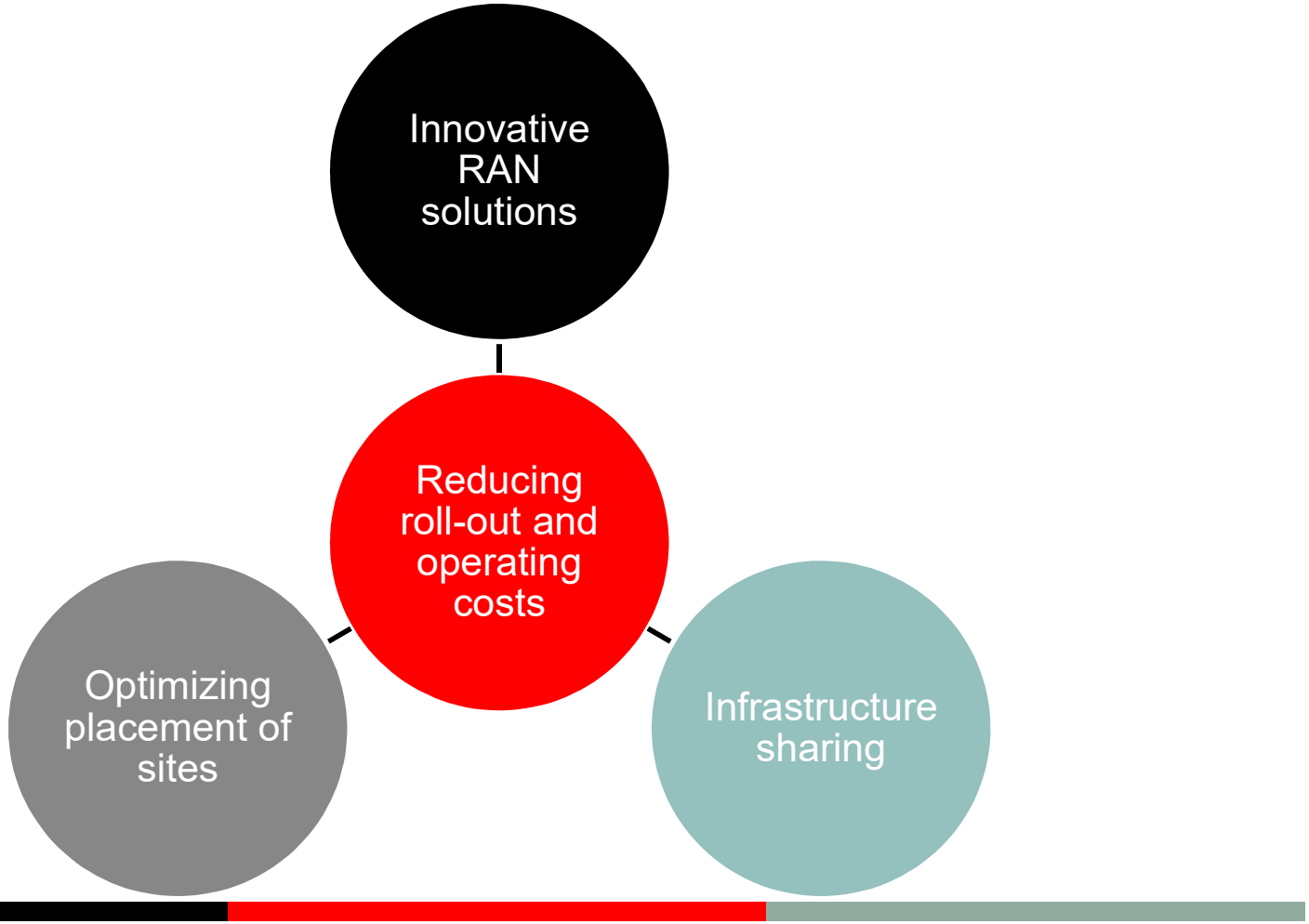
Sustainable coverage of rural areas requires a very steep cost reduction

- Making rural areas commercially viable requires costs to be reduced by more than a factor of 10.

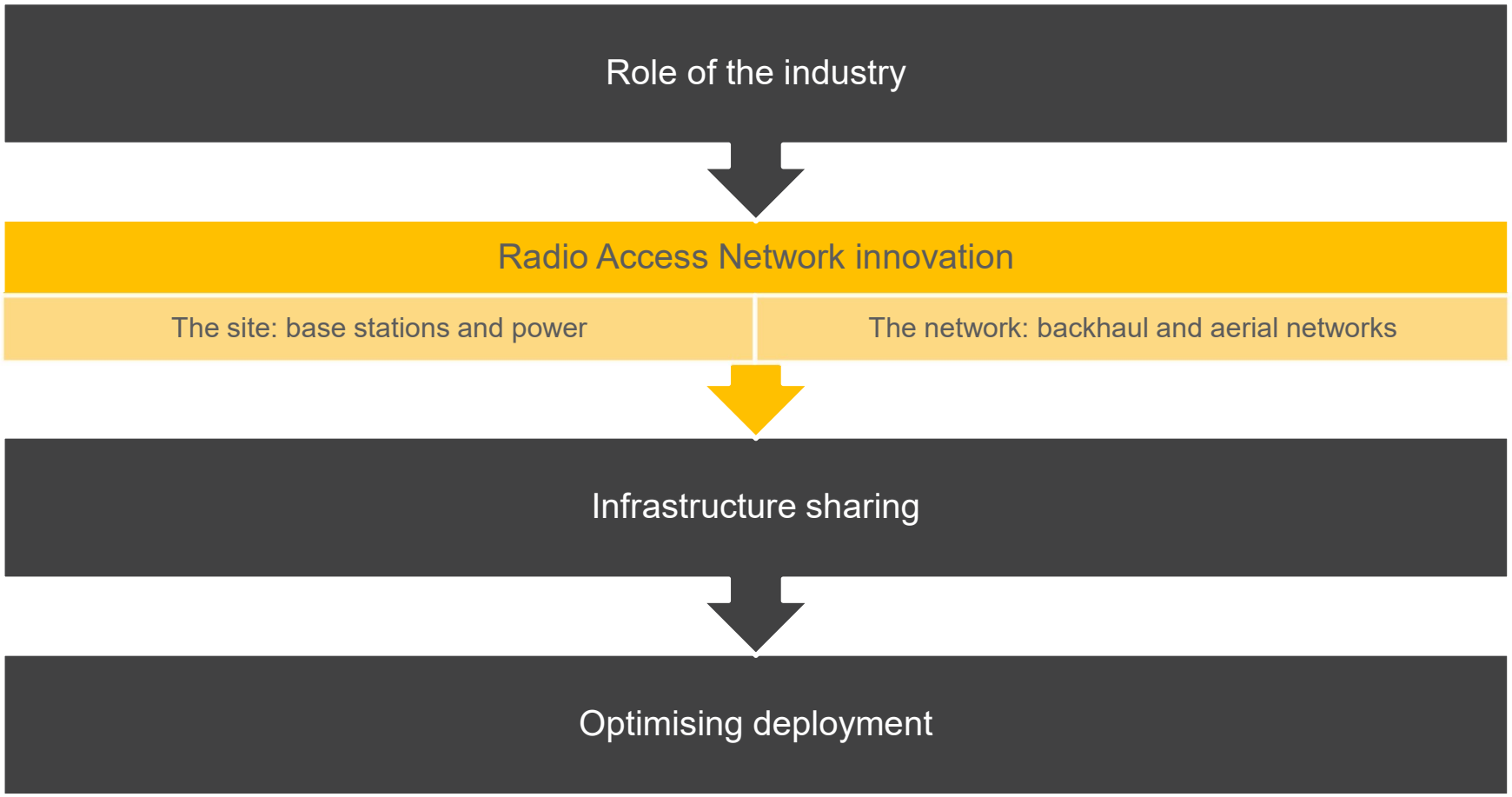


* GSMA Connected Society Programme

Operators and the GSMA are exploring alternatives for decreasing roll-out and operation costs



Radio Access Network innovation



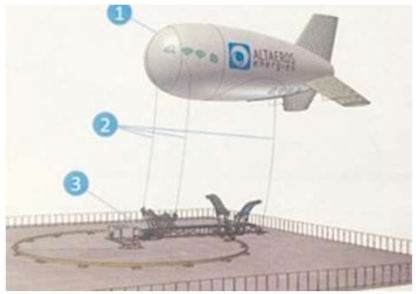
Innovative RAN solutions: three priorities

Base station	• Reduce the cost of rolling-out and operating remote sites in areas with poor infrastructure
Power	• Decrease energy costs and increase uptime of rural sites
Backhaul	• Reduce the CAPEX and OPEX of high throughput backhaul in rural areas

The GSMA has developed a tool to track these innovations, for further information visit: **gsma.com/CS-DIIP**

Base station innovation

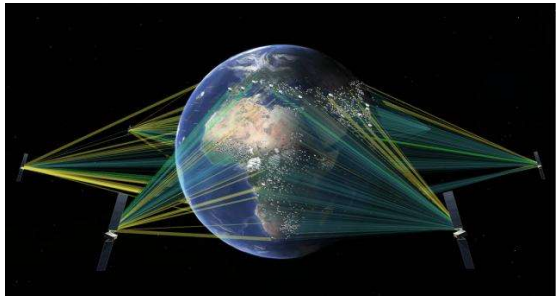
Type of Base Station innovation	Examples of companies/solutions
Rural-specific base stations	Fairwaves NuRAN wireless Mavenir OpenRan Huawei RuralStar Ericsson Psi Coverage ZTE Rural Pole
Community based approach	Nokia Kuha
Super wide coverage	Altaeros Loon Ubiquitilink

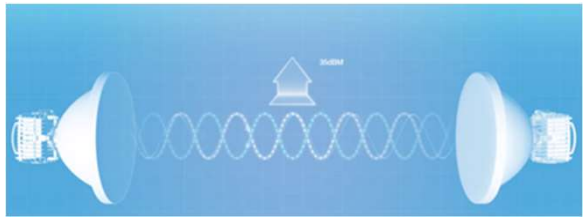





Backhaul innovations

Type of Backhaul innovation	Examples of companies/solutions
Terrestrial	Huawei RuralStar (LTE relay) DragonWave-X Mynaric
Satellite	Astranis (GEO) O3B (MEO) OneWeb (LEO)

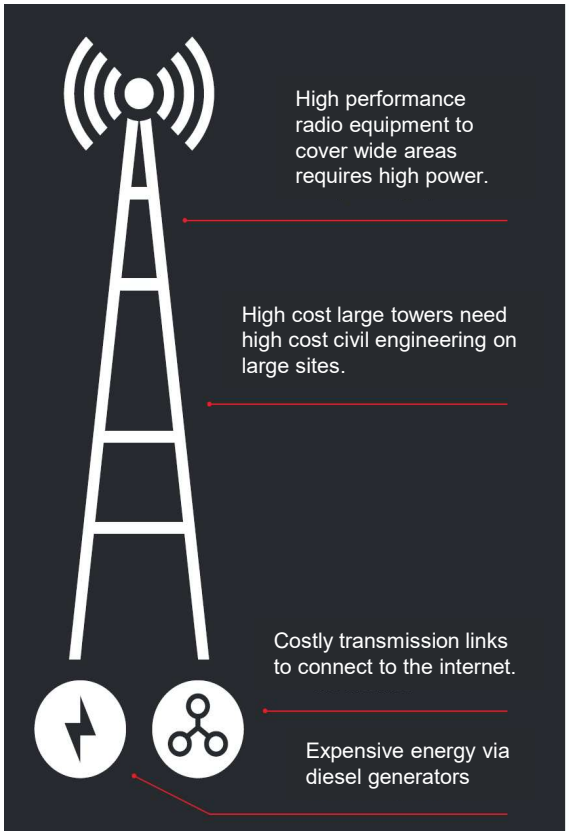


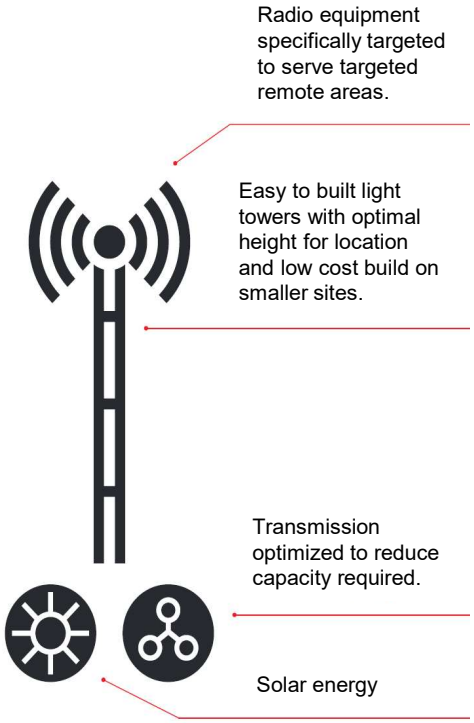


Power innovations

Type of Power innovation	Examples of companies/solutions
Energy optimisation	Huawei PowerStar ClearBlue Technologies Energy Vision
Minigrid	Nokia Fusion Grid OMC Power
Energy source	Powidian (Hydrogen) Gencell (Amonia)

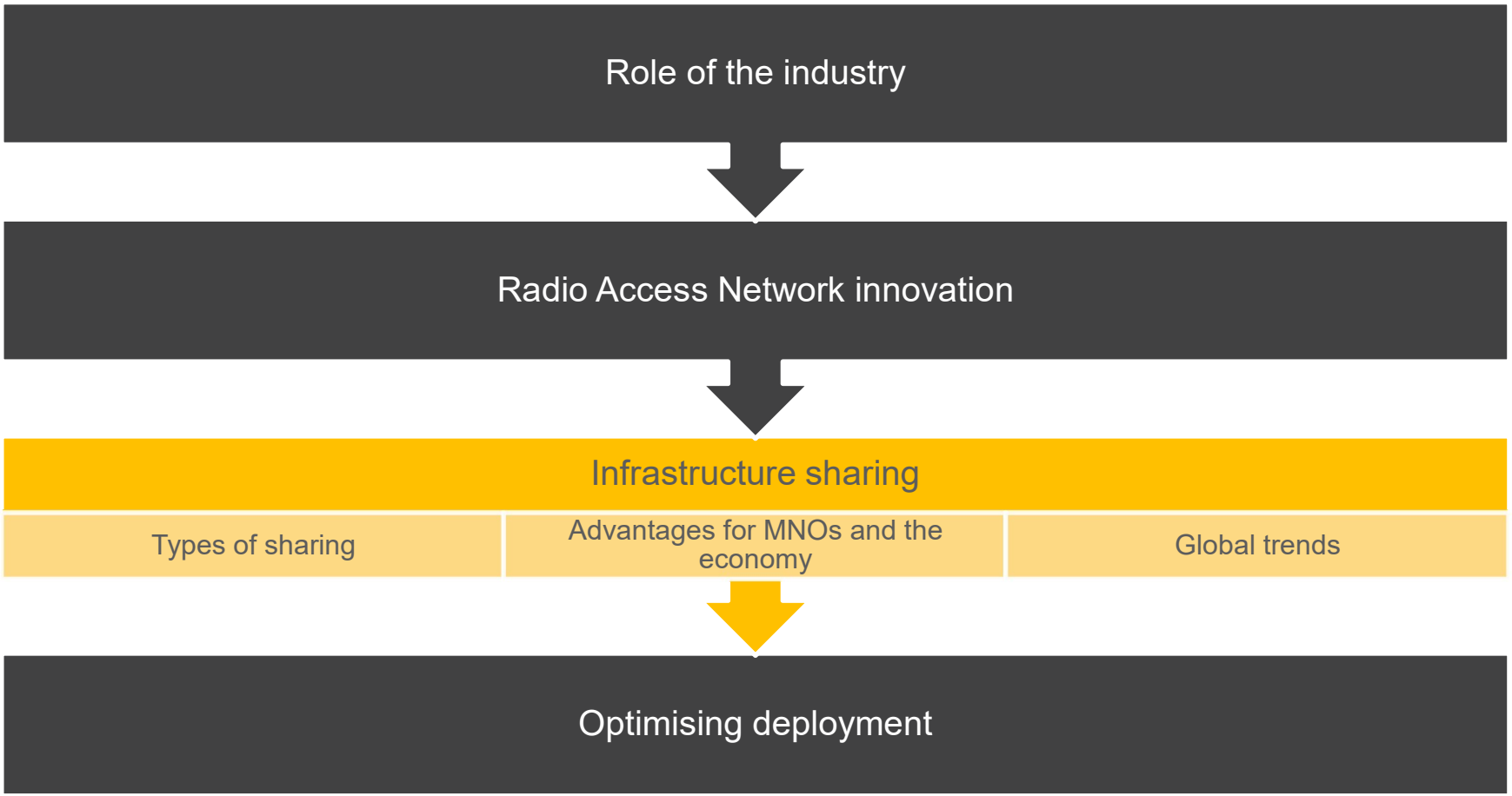
GSMA Innovation Fund for Rural Connectivity





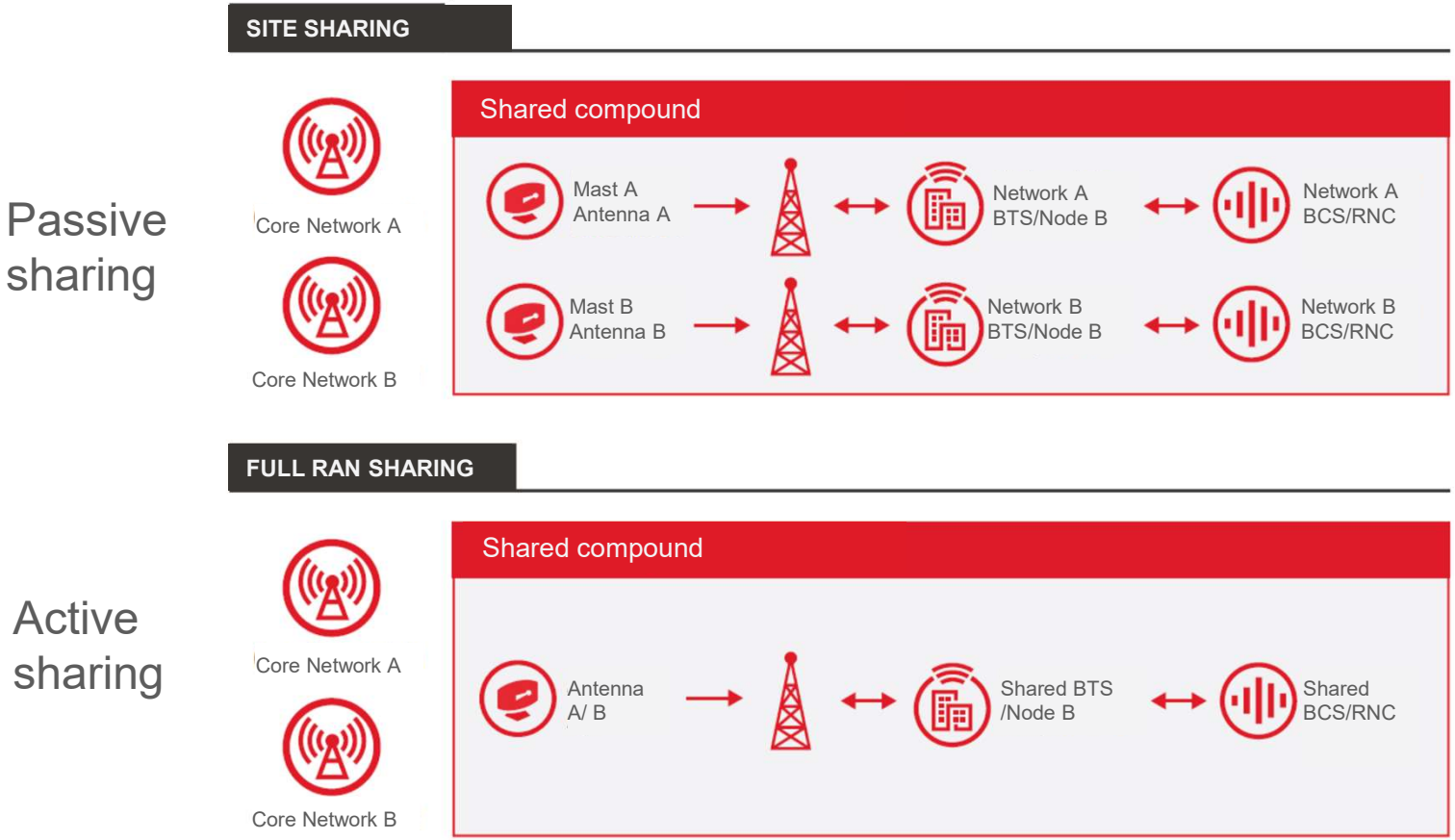
- ✓ The provision grants to build pilot sites in selected rural coverage areas
- ✓ Partnering with mobile operators in Ghana and Uganda to connect to their network and services
- ✓ Identify and validate coverage areas through our coverage mapping tool
- ✓ Select the most promising innovations through an RFP process
- ✓ Monitor technical and commercial KPIs to evaluate the best solutions to scale

Infrastructure sharing



Infrastructure sharing

Infrastructure sharing involves mutualising part of the infrastructure of a mobile network between two or more mobile operators.



Types of sharing

- Passive sharing can be done directly between operators or via a tower company
- Roaming is a very specific case, as there is no co-ownership of infrastructure, only a virtual sharing of services.

Element of network shared	Passive sharing	MORAN	MOCN	Roaming
Site + mast	X	X	X	X
Power	X	X	X	X
Antennas + BTS+ RNC + Backhaul		X	X	X
Spectrum			X	X

MORAN: Multi Operator Radio Access Network
MOCN: Multi Operator Core Network

Types of sharing: strengths and weaknesses (1)

Type	Strengths	Weaknesses
Passive	• Most CAPEX savings come from passive sharing • Maximum independence in choice of technology and service differentiation	• Duplication of active equipment • Lack of dynamic efficiencies from geographical split

Types of sharing: strengths and weaknesses (2)

Type	Strengths	Weaknesses
Passive	• Most CAPEX savings come from passive sharing • Maximum independence in choice of technology and service differentiation	• Duplication of active equipment • Lack of dynamic efficiencies from geographical split
MORAN	• No duplication of CAPEX • Service differentiation • MNOs keep control over roll-out and quality	• Higher complexity in governance and operation • Difficult asset transfer and exit (mitigated in case of geographical split)

Types of sharing: strengths and weaknesses (3)

Type	Strengths	Weaknesses
Passive	• Most CAPEX savings come from passive sharing • Maximum independence in choice of technology and service differentiation	• Duplication of active equipment • Lack of dynamic efficiencies from geographical split
MORAN	• No duplication of CAPEX • Service differentiation • MNOs keep control over roll-out and quality	• Higher complexity in governance and operation • Difficult asset transfer and exit (mitigated in case of geographical split)
MOCN	• Same as MORAN • More efficient use of spectrum (usually more important in urban areas)	• Same as MORAN • The need for spectrum pooling regulation

Types of sharing: strengths and weaknesses (4)

Type	Strengths	Weaknesses
Passive	• Most CAPEX savings come from passive sharing • Maximum independence in choice of technology and service differentiation	• Duplication of active equipment • Lack of dynamic efficiencies from geographical split
MORAN	• No duplication of CAPEX • Service differentiation • MNOs keep control over roll-out and quality	• Higher complexity in governance and operation • Difficult asset transfer and exit (mitigated in case of geographical split)
MOCN	• Same as MORAN • More efficient use of spectrum (usually more important in urban areas)	• Same as MORAN • The need for spectrum pooling regulation
Roaming	• Easier and faster to implement • Easier to transfer assets and exit	• Low service differentiation • Quality challenges if coverage is patchy

Advantages of sharing from the mobile operator's perspective (1/3)

There are three main advantages of infrastructure sharing for an operator:

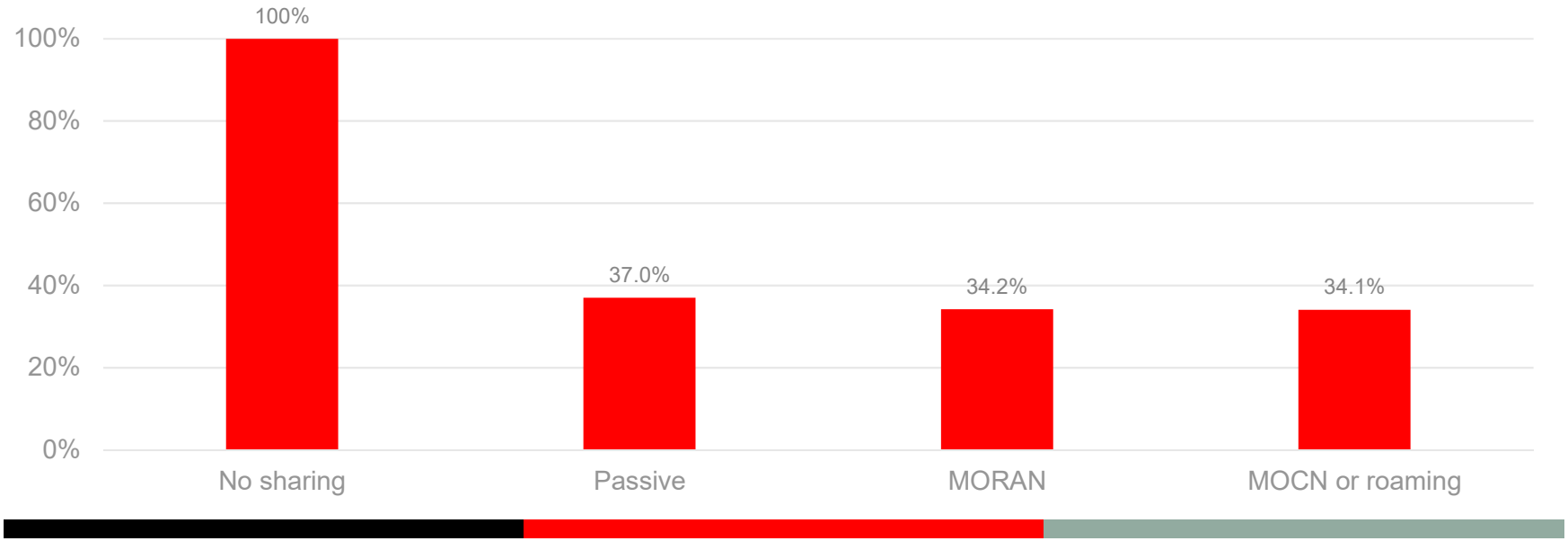
1. Higher margins in high potential areas.
2. Lower capital intensity: less capital needed to achieve same level of coverage.
3. Lower risk of incurring losses on low potential areas.

Source: Connected Society Programme 2017

Advantages of sharing from the mobile operator's perspective (2/3): lower capital intensity

- Infrastructure sharing allows operators to reduce the amount of capital needed to achieve a given level of coverage.
- Dynamic gains in efficiency can lead to higher cost reductions if there is a geographical split of coverage.

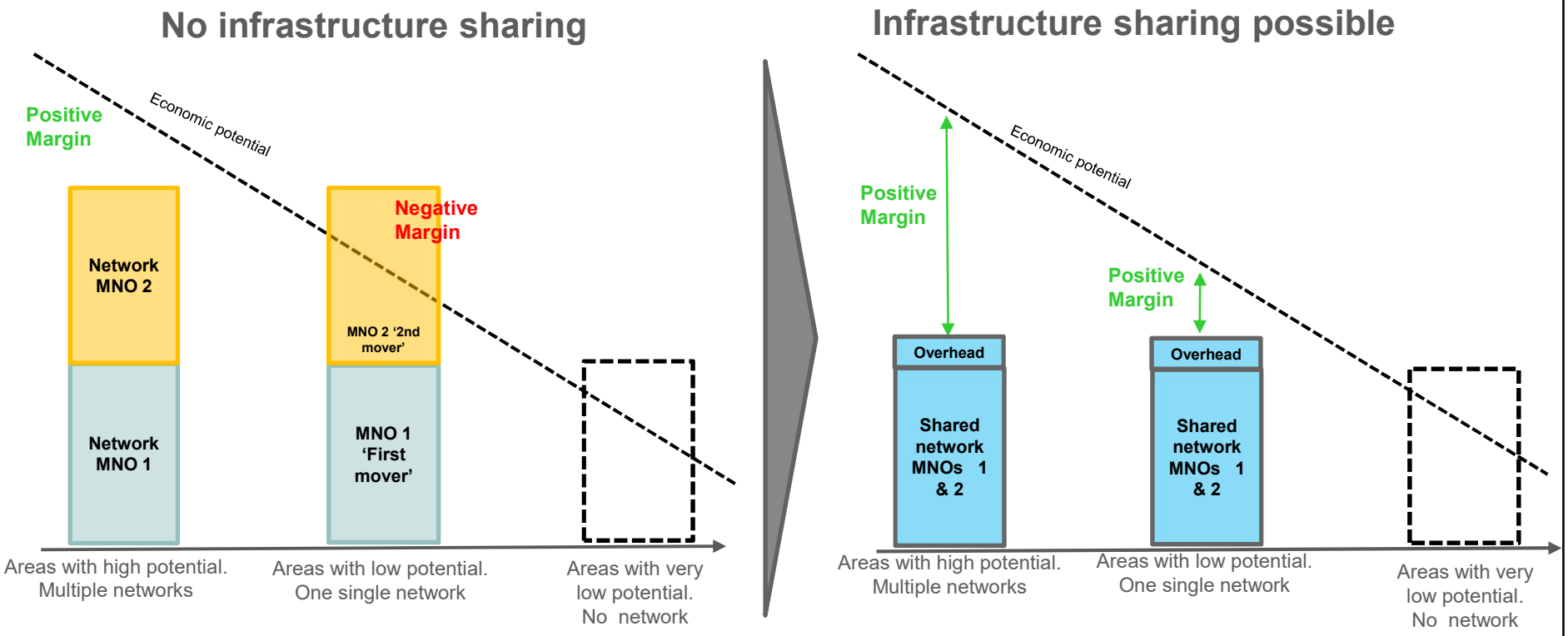
Static efficiency gains in capital and operational costs due to infrastructure sharing (3 operators)



Source: GSMA, Connected Society Programme, 2017

Advantages of sharing from the mobile operator's perspective (3/3): higher margins and lower risk

- By sharing infrastructure, operators obtain higher margins in high potential areas
- Avoid risk of seeing a 'second mover' build a network and result in negative margins

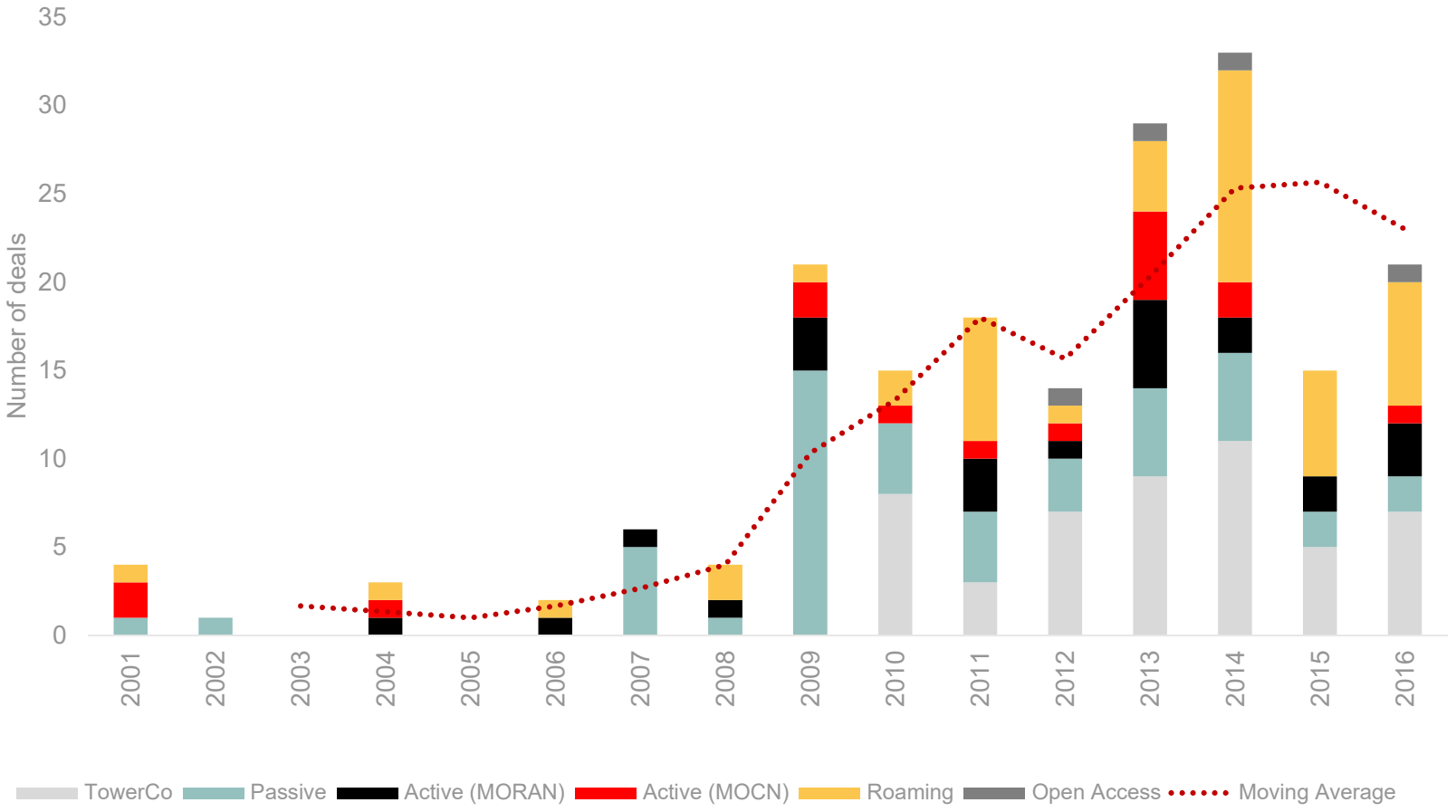


Why is infrastructure sharing good for consumers and the economy?

Four main advantages from the state's perspective:

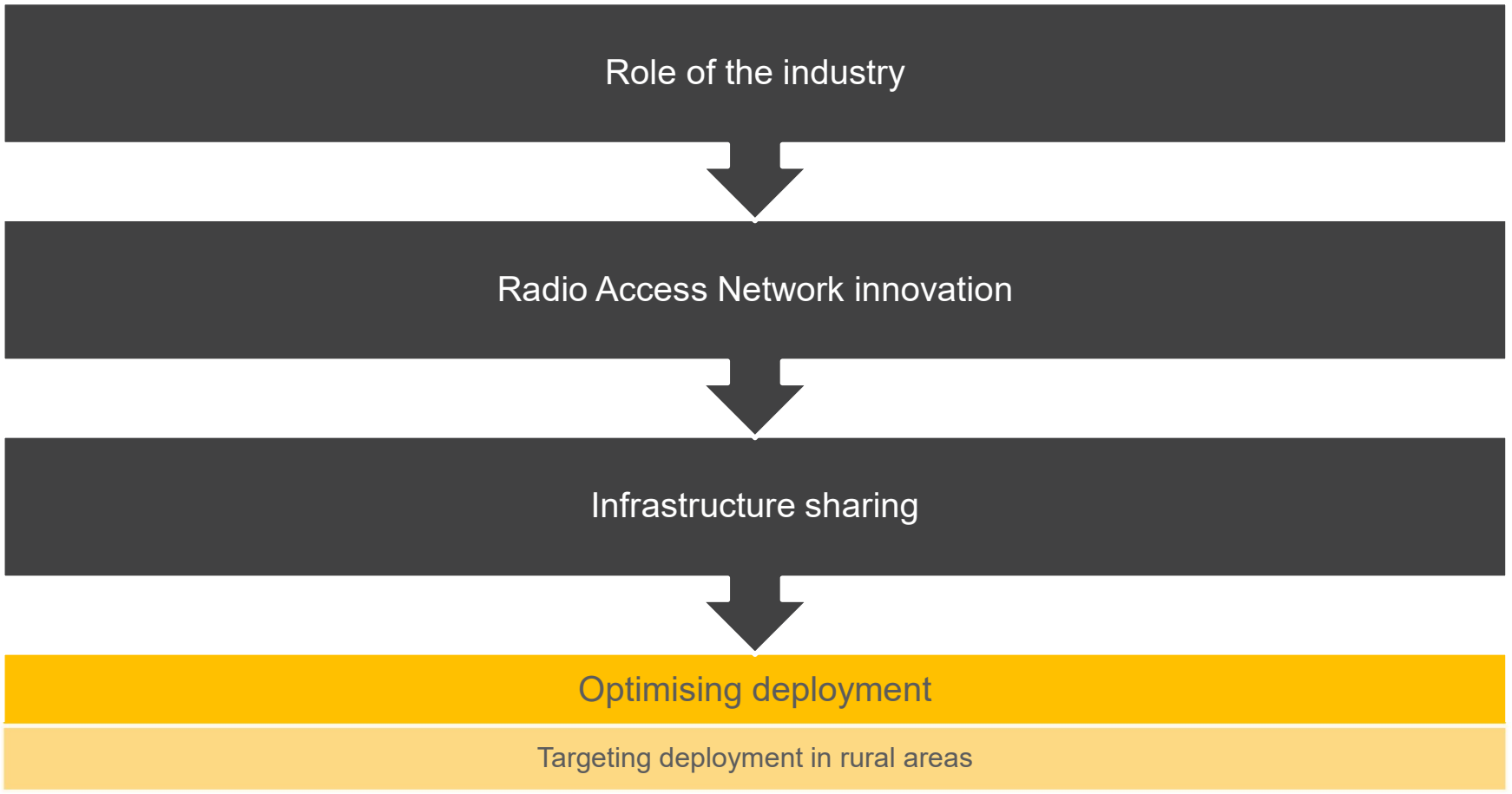
1. **More reinvestment:** higher margins mean more capacity of mobile operators to reinvest
2. **Lower prices:** lower costs lead to lower prices for consumers
3. **More competition:** sharing increases service-based competition
4. **More coverage:** lower risk, lower capital intensity and dynamic efficiencies lead to higher coverage in comparison to 'first mover advantage'.

Global trends: mobile operators around the world are leveraging infrastructure sharing to decrease costs



Source: Coleago Consulting, 2017

Optimising deployment



Optimising deployments

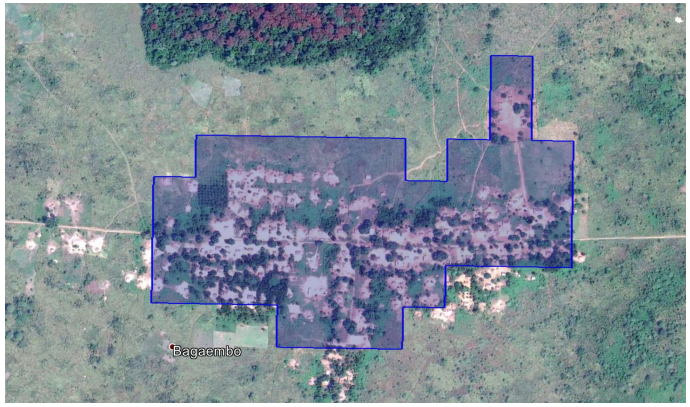
- Two factors have motivated mobile operators to work on improving the targeting of rural populations:
  - Small cells designed for rural areas (lower cost but smaller range)
  - Geo-analysis techniques to map populations using satellite imagery
- Combining these techniques, MNOs can target ultra rural areas with pockets of population

Process to optimize targeting roll-out in rural areas (1/2)

Four stage process to apply new geo-mapping techniques to target rural infrastructure investments

1

Identifying settlements



Innovative techniques to identify settlements using high-resolution satellite imagery

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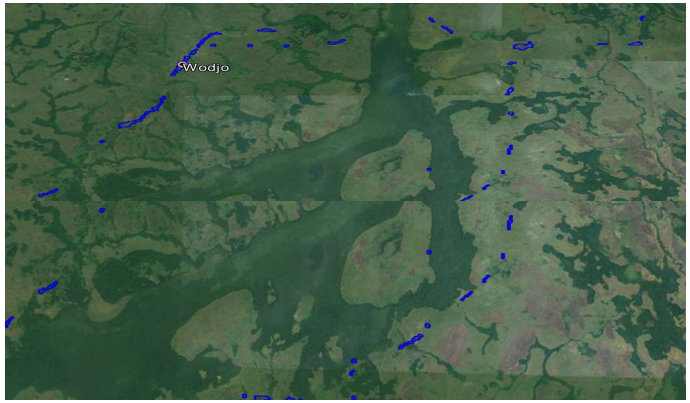
Mapping populations



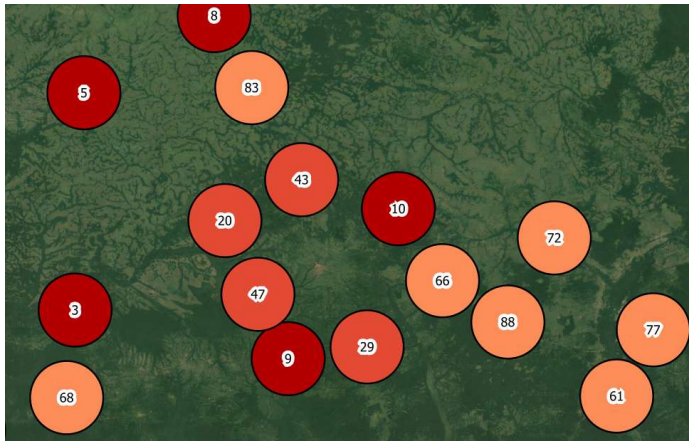
Estimating exact location of population across a country's territory

Source: GSMA Connected Society Programme

Process to optimize targeting roll-out in rural areas (2/2)

3

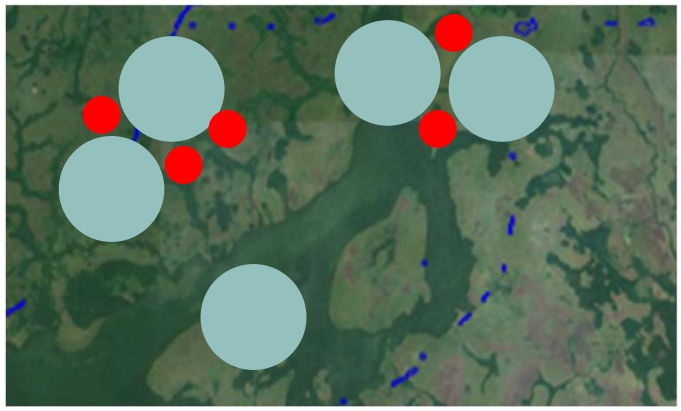
Identify profitable uncovered areas



Estimate the economic potential of uncovered areas and identify the profitable sites

4

Deploy the most suitable infrastructure

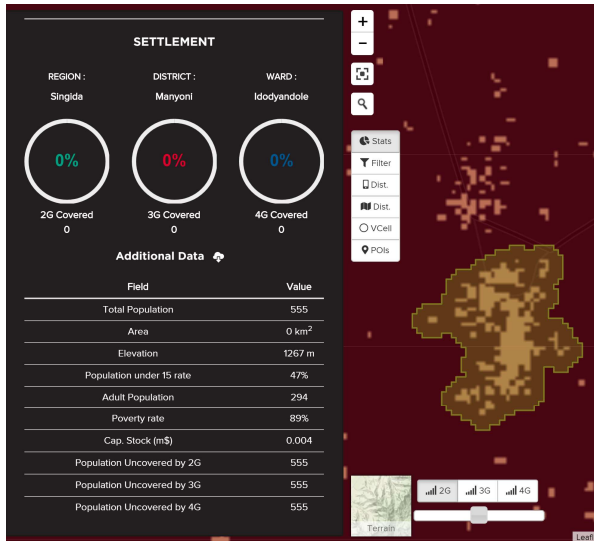


Choose the most suitable type of mobile infrastructure to ensure long term commercial sustainability

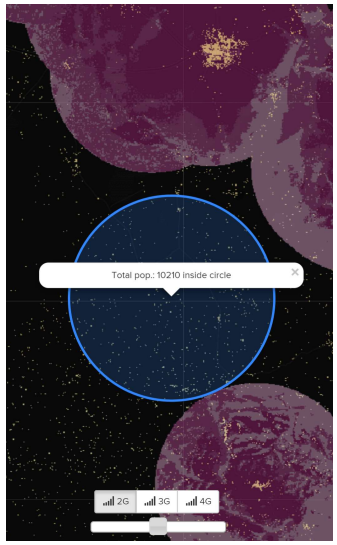
Source: GSMA Connected Society Programme

GSMA Mobile Coverage Maps

Find and explore uncovered population settlements with very high granularity



Estimate population for new deployments



- ✓ Uncovered areas (white-spots) are not well-known in emerging markets
- ✓ GSMA ideally positioned to aggregate and anonymize coverage data
- ✓ 2G/3G/4G coverage using radio consistent propagation models across MNOs
- ✓ Overlay with accurate population distribution data
- ✓ Identifying white-spots and their size in population, operators can better target and increase the ROI of their investments

www.MobileCoverageMaps.com

GSMA Capacity Building

The mobile industry alone cannot succeed in connecting the unconnected

- In session two we discussed initiatives by mobile operators to connect the unconnected.
- These initiatives target supply via reducing costs. Demand will be tackled in session four.

	Mobile operators	Government
Foster demand		
Foster supply	• Infrastructure sharing in rural area • Deployment of small cells and geo-analysis techniques • Innovation on last mile and backhaul technology	

- However, the mobile industry alone cannot tackle the challenges of connecting the unconnected.
- Governments must play their role by creating a favourable environment for innovation and investment. This will be the topic of sessions three and four.

Capacity Building

2

SESSION 2

Discussion

- What innovations are you aware of that have improved coverage in rural areas?
- What tools are available in your country to ensure optimization of coverage?