MCMC
Coopetition in telecom - Discussion On Network Sharing

Strictly Private and Confidential

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pwc

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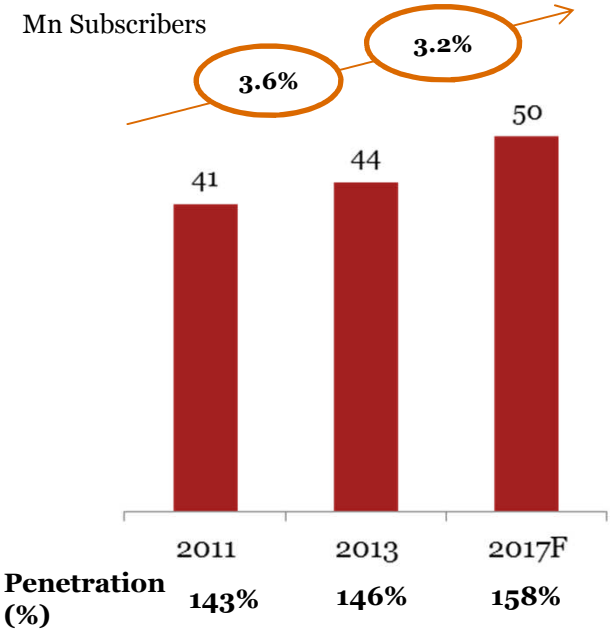
Section 1
The case for network sharing

Lower subscriber growth and declining ARPU levels are increasing the pressure on margins for Malaysian Telcos

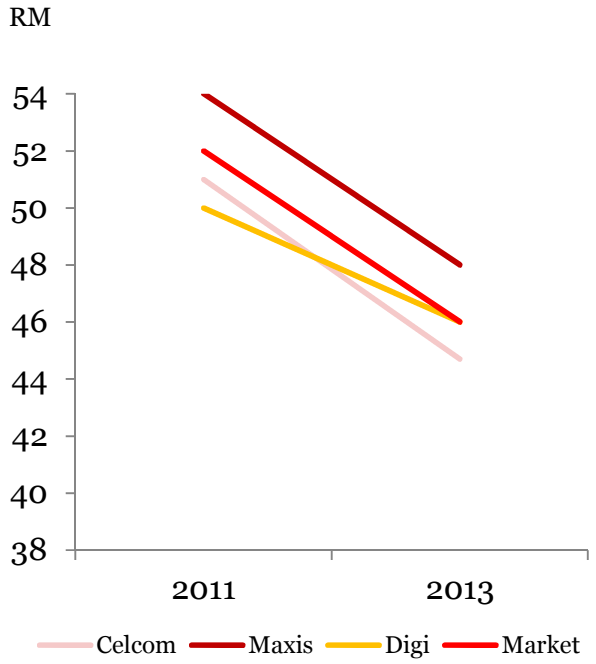
Low growth in subscribers

High penetration leading to stagnant subscriber growth rate; CAGR ~ 2%



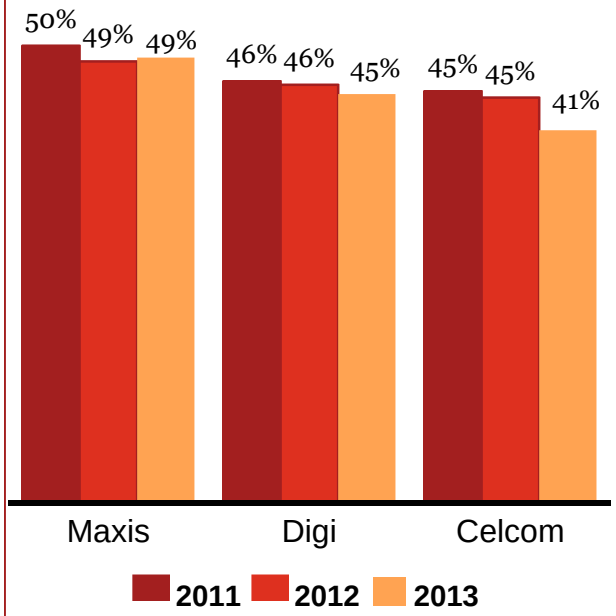
Declining ARPU

Decreasing ARPU's may lead to revenue stagnation



Pressure on EBIDTA

Increasing operating costs squeezing EBITDA margins

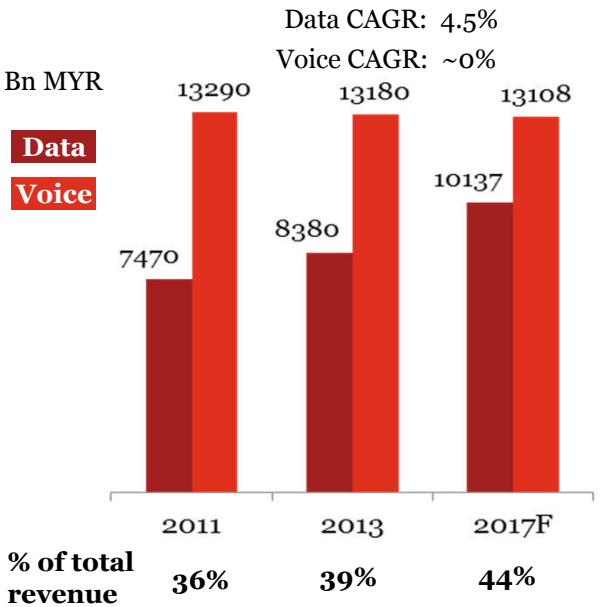


Source: SKMM, C&M Pocket Book of Statistics 2013; CIA, The World Factbook Malaysia; Maxis, Annual Report 2012; Digi, Annual Report 2012; Celcom, Annual Report 2012; Umobile, Annual Report 2012.

However, there is a need to invest on networks to cater to the increasing demand for capacity and to deploy new technologies like 4G LTE

Demand for capacity

Growth in data leading to demand for capacity

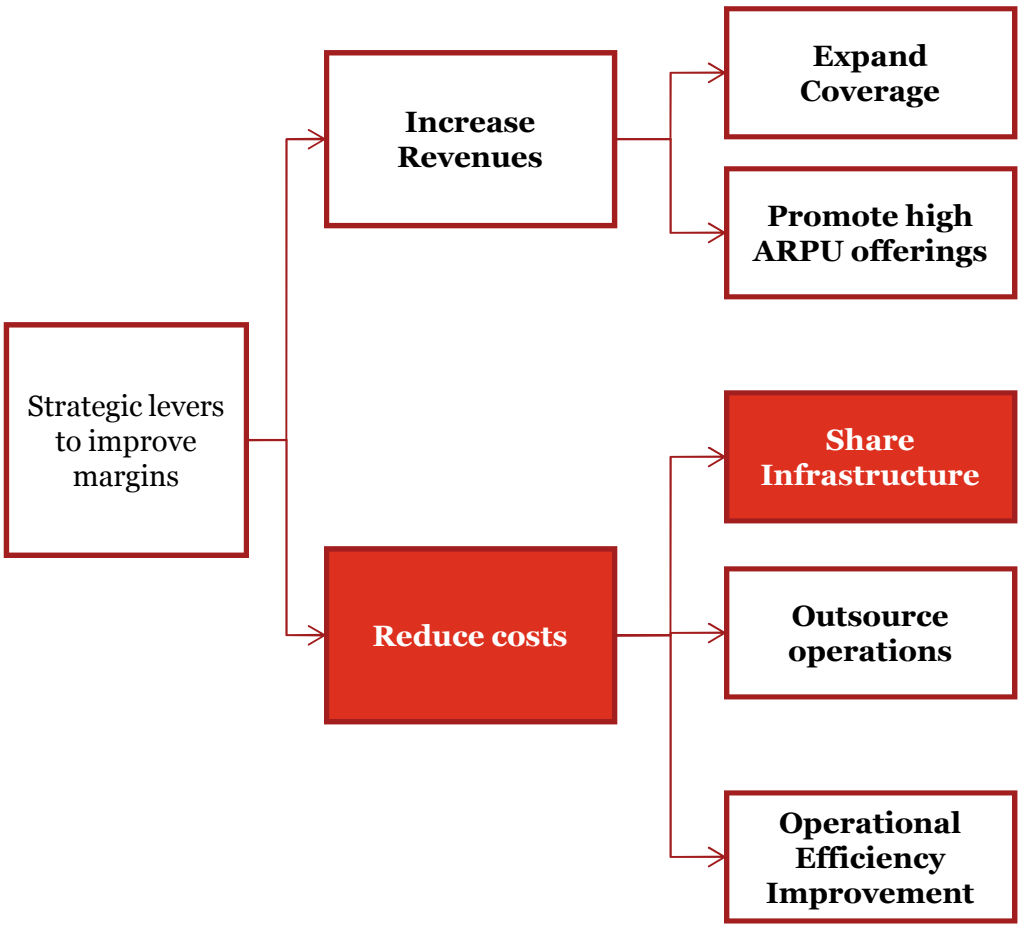


4G Deployment

- Operators are expected to expand their 4G LTE services in the near future:
  - Maxis launched 4G LTE services during Jan 2013
  - Celcom launched its 4G LTE experience centers during Jan 2013
  - Digi is expected to launch 4G LTE services by end of 2013

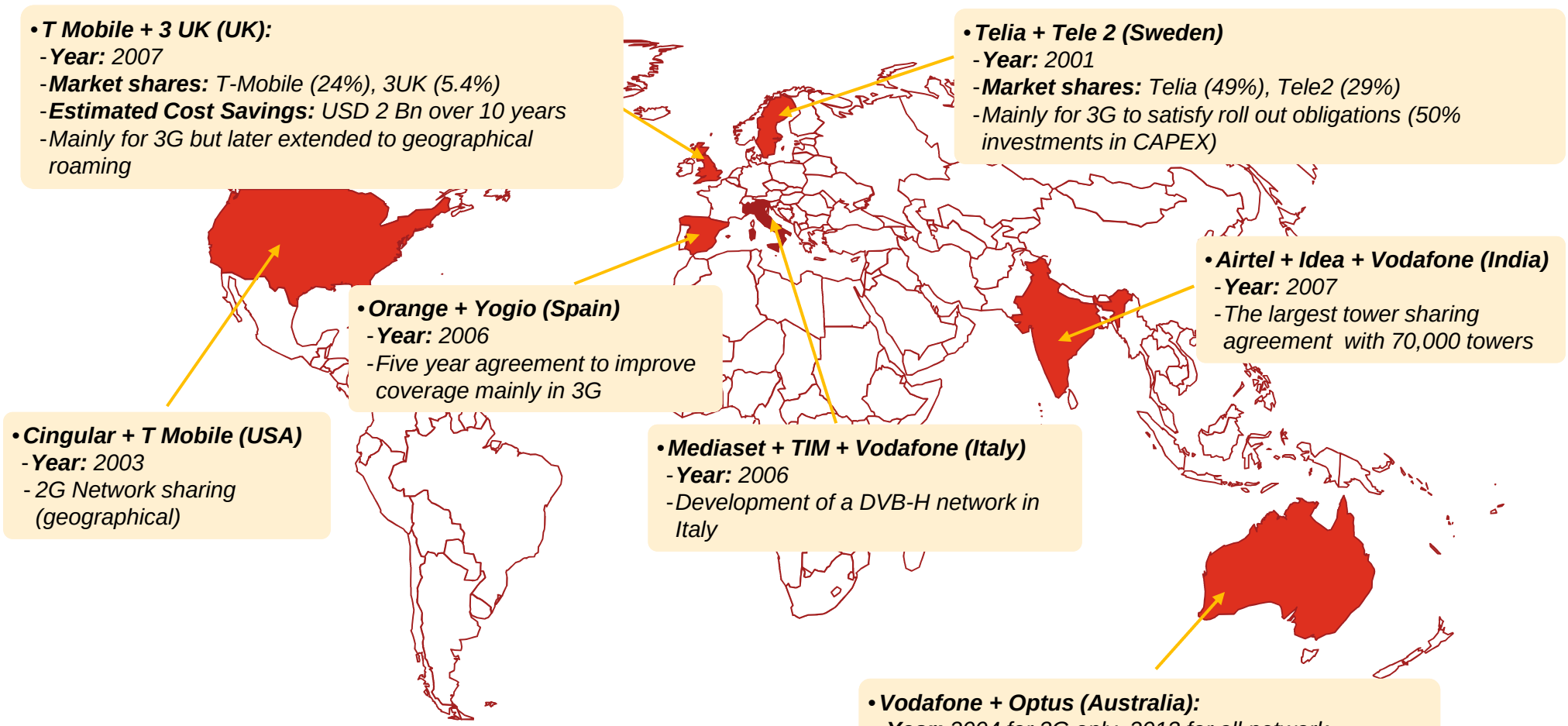
Source: SKMM, C&M Pocket Book of Statistics 2013; CIA, The World Factbook Malaysia; Maxis, Annual Report 2012; Digi, Annual Report 2012; Celcom, Annual Report 2012; Umobile, Annual Report 2012.

Network sharing offers one of the highest potential for Telcos to improve margins and optimize future investments



Potential	Points to consider
Limited	• 95% of population already under network coverage
Limited	• Revenue shifting from Telcos to OTT players resulting in failure of monetization of content • Incremental subscriber base is expected to be mostly low ARPU and rural areas
High	• Ability to deliver significant capex and opex savings for existing and new network rollout
Medium	• Allows MNO's to convert fixed cost into variable cost, thus managing cost performance • MNOs have already outsourced some of their non-core operations, reducing the incremental potential of this method
Limited	• MNOs have already implemented majority of cost saving measures

Globally other telecom operators have used network sharing as a way to optimize costs while growing the network



- ***T Mobile + 3 UK (UK):***
  - ***Year:*** *2007*
  - ***Market shares:*** *T-Mobile (24%), 3UK (5.4%)*
  - ***Estimated Cost Savings:*** *USD 2 Bn over 10 years*
  - *Mainly for 3G but later extended to geographical roaming*

- ***Telia + Tele 2 (Sweden)***
  - ***Year:*** *2001*
  - ***Market shares:*** *Telia (49%), Tele2 (29%)*
  - *Mainly for 3G to satisfy roll out obligations (50% investments in CAPEX)*

- ***Orange + Yogio (Spain)***
  - ***Year:*** *2006*
  - *Five year agreement to improve coverage mainly in 3G*

- ***Airtel + Idea + Vodafone (India)***
  - ***Year:*** *2007*
  - *The largest tower sharing agreement with 70,000 towers*

- ***Cingular + T Mobile (USA)***
  - ***Year:*** *2003*
  - *2G Network sharing (geographical)*

- ***Mediaset + TIM + Vodafone (Italy)***
  - ***Year:*** *2006*
  - *Development of a DVB-H network in Italy*

- ***Vodafone + Optus (Australia):***
  - ***Year:*** *2004 for 3G only, 2013 for all network*
  - ***Market shares:*** *Vodafone (15%), Optus (30%)*
  - ***Expected cost savings:*** *$ 300 Mn in 5 years*
  - *Share towers and geographical roaming*

Malaysian telecom market is at the same level of maturity as other markets where network sharing has already been implemented

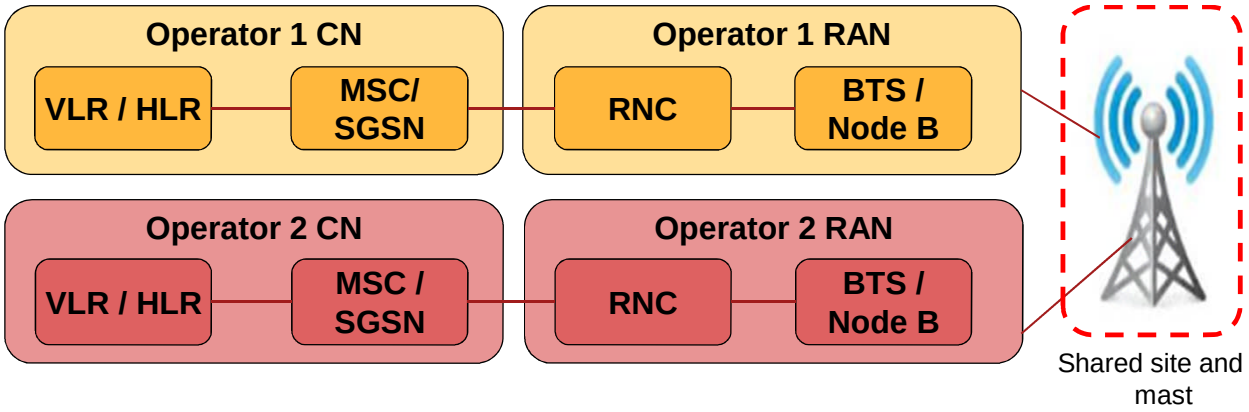
	Malaysia	Sweden	US	Australia	UK	India
Penetration (2013)	~146%	~128%	~86%	~110%	~136%	~70%
Major players	Major-Maxis, Celcom , DiGi, YTL, Umobile, Redtone	Telenor, Tele2 , Telia, Orange	AT&T, Verizon, Cingular, Sprint, T-Mobile	Optus, Telstra, Vodafone	O2, Vodafone,3 mobile, Orange, T Mobile	Bharti Airtel, Vodafone, Idea, Reliance
Technologies deployed	3G Rollout 4G launched in 2013	4G Rollout	4G Rollout	4G Rollout	4G launched in 2013	3G Rollout 4G launched in 2014
Extent of sharing	Passive: Nascent Active: Nascent	Passive: Mature Active: Mature	Passive: Mature Active: Mature	Passive: Mature Active: Mature	Passive: Mature Active: Mature	Passive: Mature Active: Not present

However, it has been late in implementing network sharing to the extent done in the mature markets

Section 2
Different types of network sharing

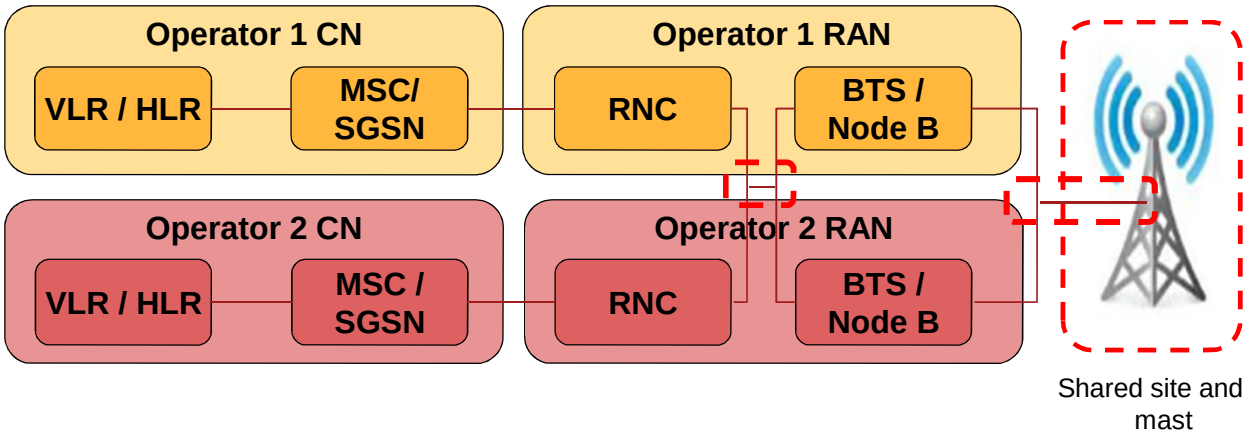
Different types of network sharing (1/3)

Passive Site Sharing



- Masts, rooftop, cabinets, shelters etc.
- Physical space such as compound, security alarms and passive technical facilities such as power supply, battery backup etc.

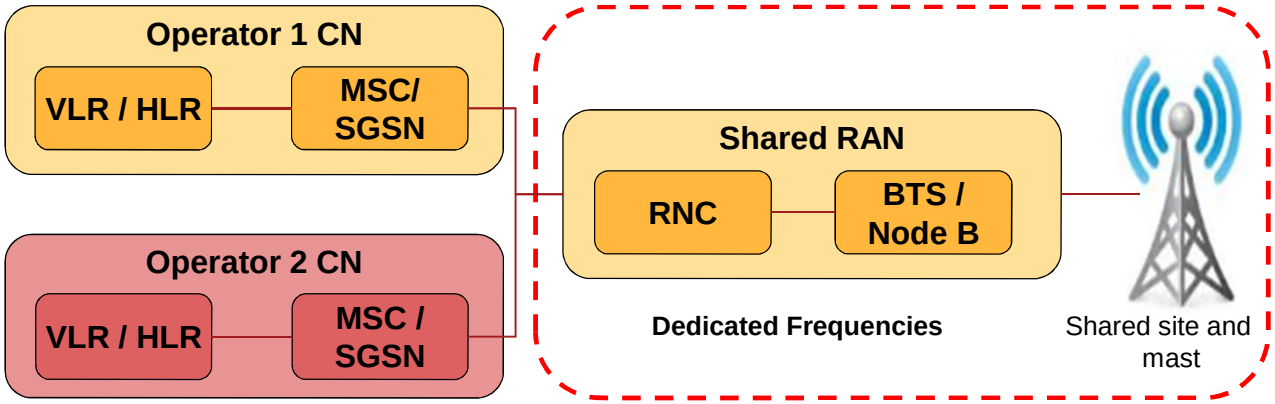
Passive Site sharing + Transmission sharing



- In addition to the above shared transmission links, feeders, antennas

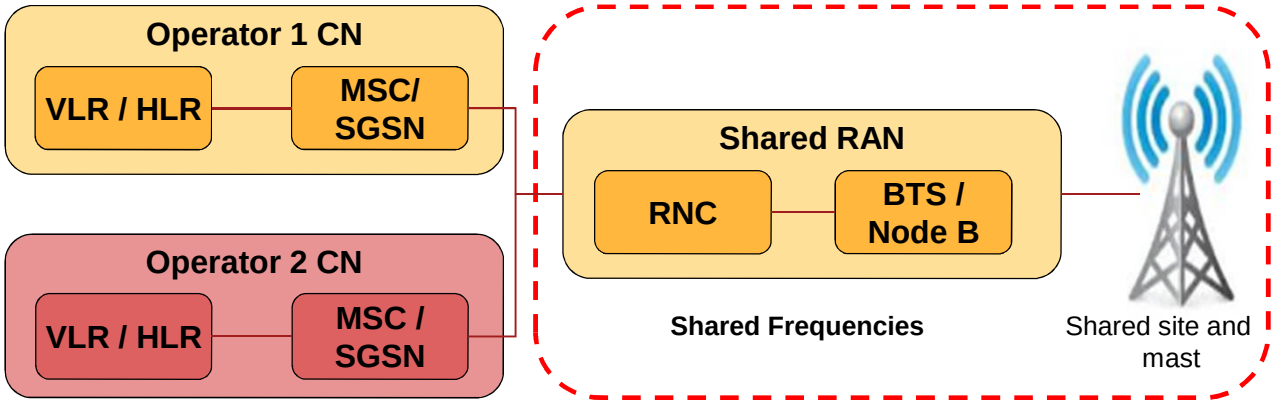
Different types of network sharing (2/3)

Multi Operator Ran Network (MORAN)



- Mainstream industry approach to active sharing
- RAN is shared but spectrum is not shared (dedicated frequency bands)
- Device independent as it does not require any device support to choose the operator frequency
- RNC and Node B are logically partitioned between sharing parties
- Common site level parameters but operators can independently control cell level parameters

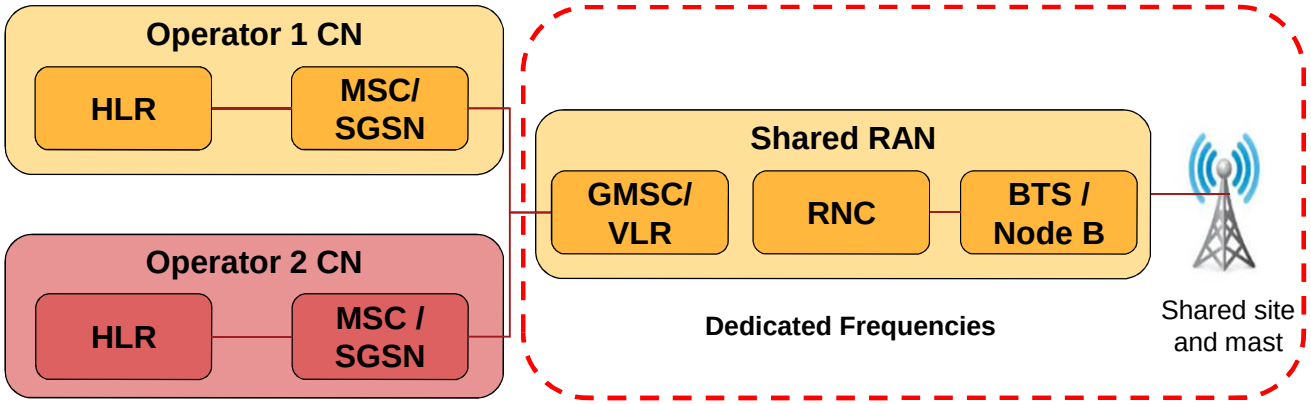
Multi Operator Core Network (MOCN)



- Specified in 3GPP Release 6
- Operators share both RNC and Node B and pool their frequencies
- Spectrum sharing is a major limitation of this situation
- Device dependent as some devices need the 3GPP Support to choose the different operator frequencies

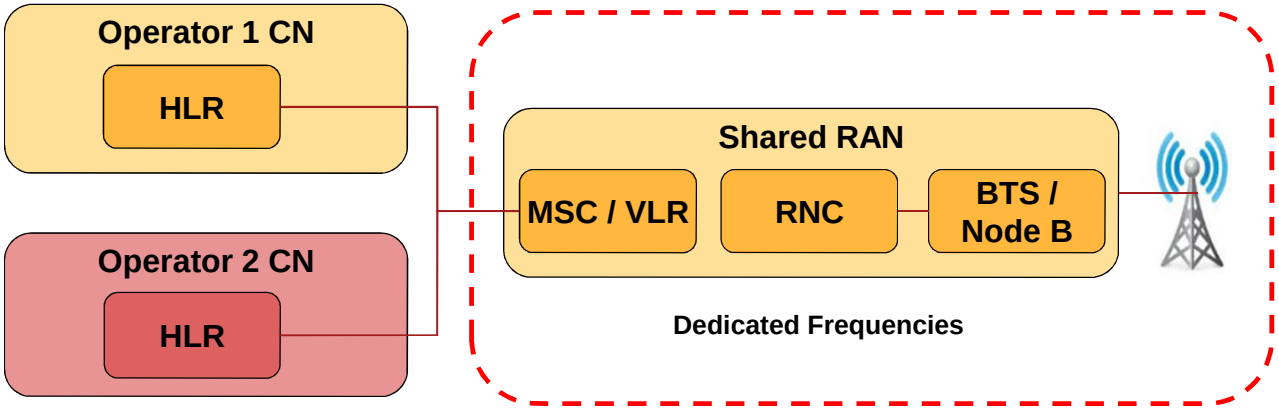
Different types of network sharing (3/3)

Gateway Core Network (GWCN)



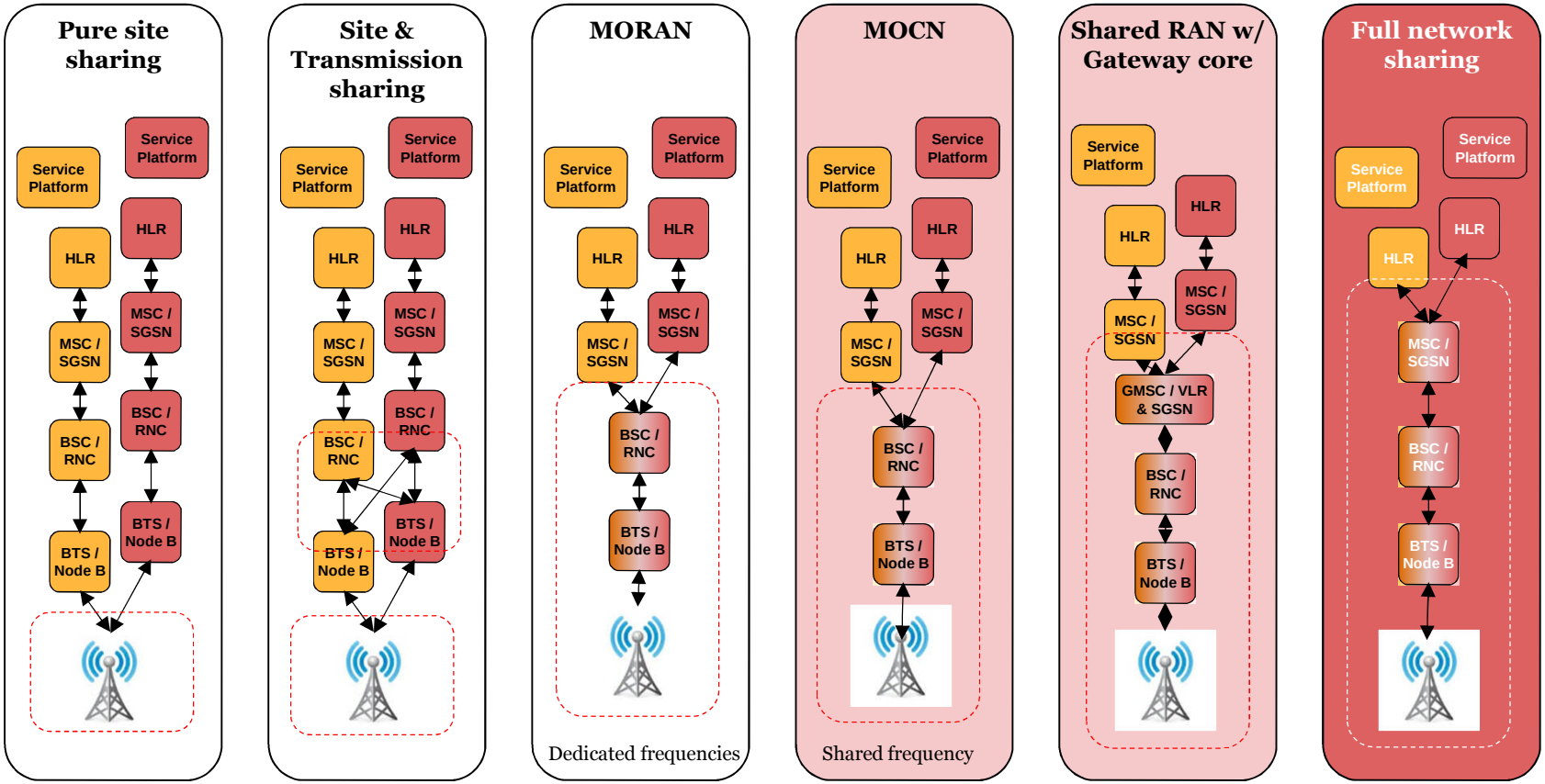
- A multi operator core network in which multiple core nodes are connected to the same RNC and the CN nodes are operated by different operators
- Operators share part of the core network in addition to the RAN such as GMSC, VLR
- Not as wide spread as the use of MORAN or MOCN

Full network sharing (MVNO and Roaming)



- In MVNO typically the operators would share the entire network but maintain different HLR services
- The MVNO could be leasing of capacity from wholesale resellers as well
- In case of roaming one operator roams on the network of the other operator

Summary of different network sharing techniques



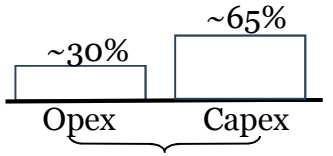
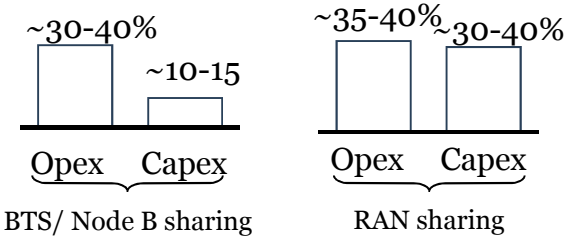
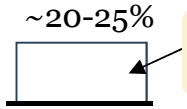
	Pure site sharing	Site & Transmission sharing	MORAN	MOCN	Shared RAN w/ Gateway core	Full network sharing
Passive	✓	✓	✓	✓	✓	✓
Active		✓	✓	✓	✓	✓
Spectrum				✓		✓
Transmission		✓	✓	✓	✓	✓

Commonly used techniques by large operators globally

Uncommon as it is difficult to implement

Commonly used by regional operators or small operators

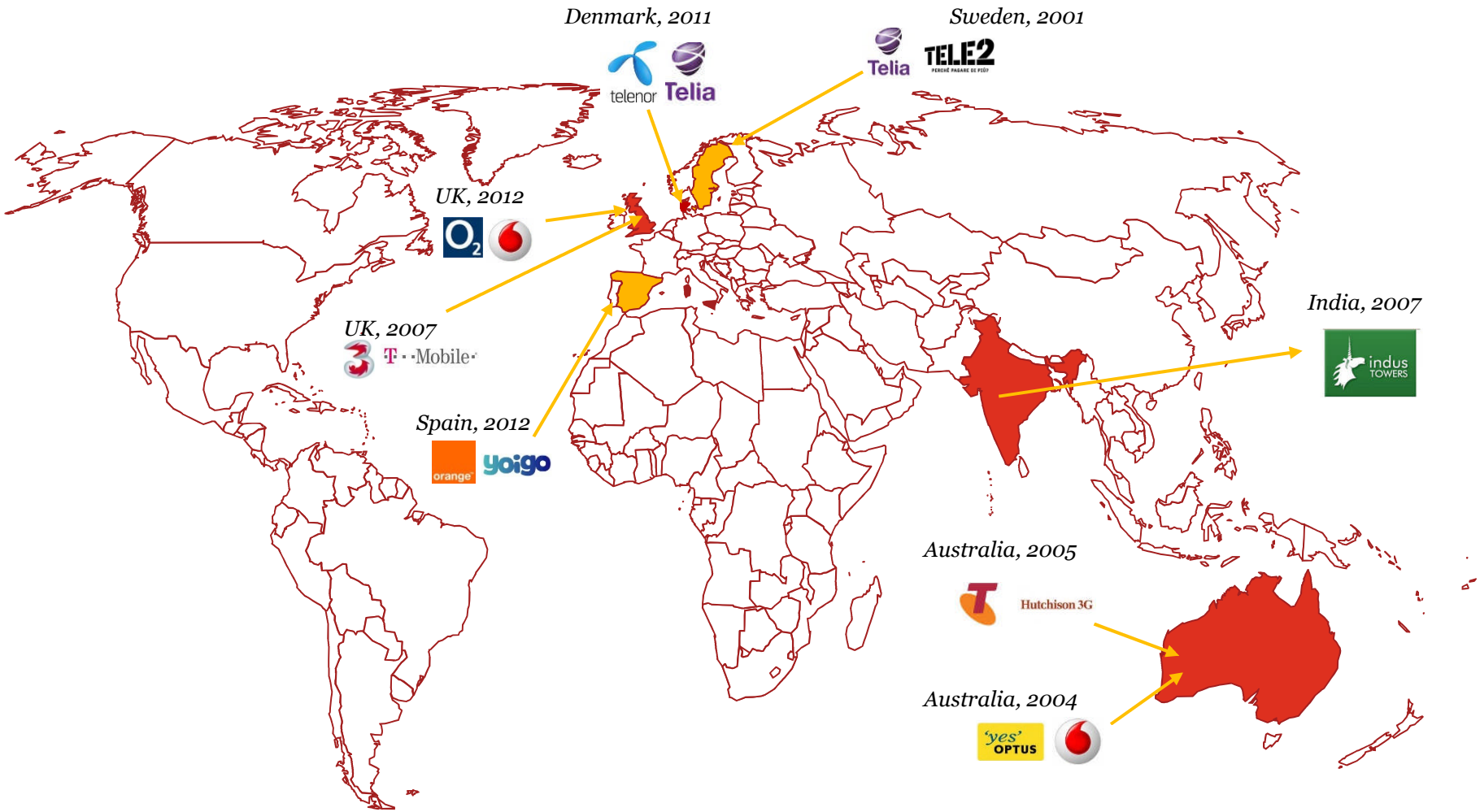
Each flavor has different benefits and potential cost savings for the operators

	Key benefits	Potential Cost savings
Passive sharing	• Capex and opex cost reduction • Focus on sales / marketing – move away from tower management • Speed to market	
Spectrum Sharing	• Reduces requirement for additional spectrum • Lower spectrum charges	*Depends on the market situation in terms of availability of additional spectrum and spectrum charges levied*
Active sharing	• Capex and opex savings (in case of new roll out) • Speed to roll out • Focus on core business	 BTS/ Node B sharing RAN sharing
Transmission Sharing	• Capex savings • Time to build network • Immediate connectivity to sites	*Cost savings vary depending on level and scale of backhaul leased*
O&M Sharing	• Cost savings • Better use of capital and resources • Faster time to market	 % Cost saving in network opex *Assuming network opex accounts for two thirds of total network opex*

Additional benefits

Section 3
Global Case Studies

We have analyzed a number of network sharing deals from across the world



Case study - UK

3UK - T Mobile UK (2007 -present)

Player profiles – T Mobile was among top three players in the UK market with 24% market share as compared to 6% of 3 UK at that time. However, 3 UK had extensive 3G coverage that T mobile could use.

Rationale: Increase coverage and reduce capex and Opex costs

Deal Structure: 50:50 joint venture company called MBNL was set up to consolidate Network Infrastructure. MBNL further partners with NSN, Ericsson and Huawei for network equipment and services

Scope: RAN, backhaul equipment and passive infrastructure used for provision of 3G connectivity .

Operations: Consolidation was completed in 37 months with 12500 sites consolidated and over 2000 sites switched off. Expected savings for $ 2Bn over 5 yrs.

Vodafone - O2 (2009 – present)

Player profiles – O2 (27% market share)and Vodafone (24%) were of similar size when started pooling resources in 2009. In 2012 the resource pooling was formalized through a larger deal and a JV company

Rationale: Capex and Opex savings

Deal Structure: 50:50 joint venture company was set up to consolidate Network Infrastructure. Vodafone and O2 would control and manage operations of the JV in specific geographies in England, Ireland, Scotland and Wales

Scope: Active equipment and passive infrastructure for 2G, 3G and prospectively 4G

Operations: 18500 sites expected to be consolidated, 2000 sites to be switched off.

Key lessons:
- The collaborating entities need not be of similar sizes for a deal to succeed
- Sharing typically start with passive infra and new technologies such as 3G as they are easier to implement
- Operations were handled differently by both partnerships

Case study - Australia

Telstra – Hutchison (2005 - 2012)

Player profiles – Telstra had a market share of 67% and Hutchison had a share of around 4%. However, access to Hutchison's 3G RAN was pivotal for Telstra while they developed their own 3 G network

Rationale: Increase coverage

Deal Structure: 50:50 partnership in new formed entity 3GIS, responsible for operating and maintaining Hutchison's 3G network and develop future network. Telstra made a payment of $450 million to Hutchison to gain access to its 3G network assets

Scope: 3G RAN and Roaming

Operations: Roaming was activated immediately helping Telstra virtually increase their 3G coverage

Current State: Telstra pulled out of the partnership after Vodafone bought Hutchison. They tried to work a deal with Vodafone and Optus but talks fell through.

Vodafone – Optus (2004 – present)

Player profiles – Optus (30% market share)and Vodafone (15%) started pooling resources in 2004 to provide better 2G and 3G network quality and higher coverage

Rationale: Cost saving, increased coverage and rapid market penetration

Deal Structure: Optus and Vodafone to own 50 per cent interest in the assets . Both to have access to 50 per cent of the capacity & share the cost of building and operating 3G & 2G network

Scope: Initially only 3G but now extended to entire network

Operations: Sharing of around 3000 BTS nationwide of which around 2000 are already operational

Current State: Vodafone and Optus signed a new agreement in 2013 for sharing across 2G, 3G and prospectively 4G. Expected savings of $300 Mn in 5 yrs.

Key lessons:

- 3 way partnerships are tough to execute: Telstra not willing to partner with Vodafone and Optus
- Players must be wary of consolidation / entry of new players in the market and have sufficient exit clauses in the partnership in case they want to pull out of the partnership in the future

Case study – India

Bharti Airtel- Vodafone- Idea Cellular (2007)

Player profiles –Bharti Airtel had a market share of 23%, followed by **Vodafone** with a market share of 16% and **Idea Cellular** with a market share of 9%

Rationale: Low teledensity and the exponential growth in subscriber base (70% CAGR between 1999 -2010) in rural and semi-urban areas required operators to implement economically viable telecom infrastructure. The sharing of passive infrastructure enabled the three operators to reduce cost & time to reach the market, enhance operational efficiencies & increase revenue streams

Deal Structure: Incorporated a new independent entity –**Indus Towers** with 42% partnership from Bharti , 42% from Vodafone and 16% from Idea Cellular . Nearly 70,000 assets were brought under the purview of the newly established entity

Scope: Passive (2G & 3G)

Operations: Indus faced a number of challenges in establishing smooth operations. The key challenges were:

- Consolidation of operations: Each company had different processes, systems and tools to execute operations and it took Indus considerable time and effort to consolidate the operations. Had to redefine and set up many processes from scratch to gain efficiencies. Have an large internal process and people change management team.
- Capital gains tax: The tower assets were transferred to an intermediate company which then gave the right to Indus to use the assets. The government later claimed that this arrangement was done to prevent capital gains taxes and a case was opened against one of the parties.

Key lessons:
- Operations consolidation is often a complex task and sometimes needs revamp of existing processes
- This could also be an opportunity to assess current processes and refine them
- Tax and legal considerations for entity formation is an important consideration

Section 4
Key considerations for Malaysian market

Network sharing has a wide impact across business and strategy, thus the key to making the right decisions is understanding all the elements of infrastructure sharing

Key Considerations

1. Is this the right time to consider network sharing?
2. Which flavors/modes of network sharing to consider?
3. Who to partner with?
4. How to model the savings and benefits?
5. What should be the operating model?
6. What are the key challenges to be aware of?

Strategic drivers

- Business Case
- Regulation
- Valuation of stakes and contribution
- Legal structure impact
- Operational model
- Tax implications
- Exit Options/ future strategic options
- Accounting/ reporting
- Competitive response
- Vendor/ outsourcing strategy

Assessment Requirements

- Strategic Rationale
- Valuation Methodology
- Competition & Negotiation
- Transfer pricing
- Regulation
- Accounting and structure
- Organisation impact

Malaysian market is showing the right signs to start considering network sharing

Sign	Description
Major operators are thinking about sharing	• Celcom Axiata has formed its independent TowerCo (Edotco) which has taken over all the passive infrastructure and would now provide to other operators • Various operators have already formed deals or in active discussions on this topic with each other
Regulator is encouraging network sharing	• Regulator actively supports network sharing with the view that it will benefit the end customer in terms of better network coverage and/or lower prices
4G Deployment	• All operators are in the midst or actively considering deployment of 4G technology which can act as a catalyst for active network sharing (i.e. RAN, Core etc)

It would be the right timing now for operators in Malaysia to consider network sharing and failure to act might prove detrimental in the long run

Operators should consider a phased approach to network sharing

	Key considerations
Tower / Site Sharing	• Could start with new site roll out and extend to existing sites after consolidation of assets (~25% of sites typically overlap among operators in most markets) • Easier to collaborate on new site roll out as it would mainly be for capacity and indoor coverage
4G/3G RAN	• RAN Sharing in 4G is proven globally through solutions such as MORAN
Fibre Transmission	• Core fibre transmission infrastructure can be consolidated based on complimentary coverage • Dismantled infrastructure can be redeployed for future use
2G RAN	• Technology solution is relatively unexplored mainly as legacy equipment do not support sharing • Significant overlap of 2G network across operators will require consolidation
BTS – BSC Transmission	• Can be explored along with 2G RAN sharing with common BTS and BSC • Significant savings while deploying 3G/4G due higher bandwidth requirements
Core	• Multi-Operator Core Networks (MOCNs) are relatively unexplored globally (can be considered in the long term as parties build mutual trust)

Tower/Site sharing and 4G/3G RAN could be the immediate focus for operators to consider sharing

New technologies such as 4G can be a major catalyst as evidenced in other sharing deals across the world

Country	Involved Parties	RAN			Backhaul	Fibre	Core	Passive (Towers)
		2G	3G	4G				
Australia	Hutchison 3G		√					
	yes OPTUS / Vodafone	√	√					√
UK	3 / T-Mobile	√	√		√	√	√	√
	O2 / Vodafone							√
Spain	orange / yoigo	**Only Roaming agreement**						
Denmark	telenor / Telia	√	√	√	√			√
Sweden	Telia / TELE2							√

Choosing the right partner is often the most important and trickiest part of forming a network sharing agreement

Successful partnerships involves gaining alignment on the following key areas

Strategic	• **Objective of sharing** - Cost savings - Improve coverage quickly especially, in new technologies
	• **Service and network evolution** - Partners should agree on where, when and how they would like to roll out
Technology / Network	• **Architecture and equipments being shared** - Similar architecture and equipments make it easier to enable sharing
	• **Complementary network portfolio** - Either geographically or superiority of performance
Operations	• **Systems, Tools and Processes** - Divergent processes, tools will result in longer time for consolidation
	• **Outsourcing Plans** - Current and future outsourcing plans should be known to both the parties to leverage more synergies and plan accordingly

Operators can consider network sharing partnerships for a variety of reasons

Country	Involved Parties	Year	Relative Position	Reason for Sharing
Australia	Hutchison 3G	2005	Telstra – 67% Hutchison < 4%	• Allowed Telstra to enter the 3G Market • Improve Hutchison's of delivering new and better mobile products for 3G
	'yes' OPTUS	2004	Optus – 30% Vodafone – 15%	• Faster Rollout of 3G network while achieving cost savings
UK	T-Mobile	2007	3UK – 5% T Mobile – 24%	• Faster and more efficient rollout of 3G network • Estimated joint cost saving of £2 billion over 10 years
	O2	2012	O2 – 27% Vodafone – 24%	• Response to sharing agreement by T mobile & Orange • Provide indoor 2G and 3G coverage for 98% of UK population
Spain	orange yoigo	2009	Orange – 19% Yogio – 6%	• Faster rollout of 3G network
Denmark	telenor Telia	2011		• Faster network rollout at low cost • Manage margins in the slow growth market
Sweden	Telia TELE2	2001	Tele2 – 33% Telia – 51%	• Telia did not have 3G license which Tele 2 had • Tele2 did not have the reach that Telia had

Operators should perform a thorough financial due diligence to quantify the benefits of network sharing

- Most network sharing savings data is empirical in nature and greatly depends on factors such as market, customer base, business alignment with partnering entity etc.

- Telcos. need to perform a detailed due diligence of cost impact before entering into Network sharing agreements, to answer the following key questions-
  - Where to share
  - What to share
  - How to share

- And use the analysis to determine the structure of the Network Sharing agreement with third parties

Both Commercial and Technological aspects should be carefully considered while performing due-diligence

We recommend a clear step by step approach to calculate savings and articulate the business benefits

	Define what to share	Gather Network Data	Validate assumptions	Analyze Scenarios	Interpret Results
Action Items	• Existing v/s new network rollout • Circles/ Geographic areas for network sharing • Network elements to be shared- RAN, CORE, Transmission, Passive	• Network element wise traffic data • Peak hour utilization • Installed capacity of network elements shared • Purchase information for network equipment-prices, volume discounts, contractual terms, vendor information • Preventive maintenance-Cost & Schedule • Corrective Maintenance-Cost & Occurrence	• Synergies through capacity pooling • Volume bundling- Network equipment • Working Capital synergies- spares, inventory • Headcount rationalization • Vendor portfolio rationalization	• Reuse existing infra v/s building new • In-house O&M v/s outsourced • Volume bundling impact on savings • Workforce rationalization	• Optimum sharing strategy- Network element across different regions • Go/ no-go decisions- existing sites • Vendor (equipment & service) portfolio for benefit maximization
Output	*Scope of sharing: What , Where & How*	*Data to be used in model- Network , Purchase, Operations & Maintenance*	*Specific, tailored set of assumptions best suited to business case*	*Impact of all possible scenarios; savings achieved v/s cost incurred*	*Best case scenarios; based on key operational & strategic levers*

The choice of operating model is affected by the strategic and operational criteria's of the interested parties

	Global Examples	Description	Points Of Attention
JV of Assets With Separate Operations	**Vodafone + O2 (UK)**	• Operators jointly build or consolidate their network assets into the JV company • Operators geographically split the daily operations and O&M of the equipments	• Less impact to current O&M organization of operators • Mode of leasing the equipments • How will joint roll out of network be decided
JV of Assets and Operations	**Vodafone + Optus (Australia)** **Telia + Tele2 (Sweden)**	• Operators jointly build or consolidate their network assets into the JV company • Operations staff are also pooled into the JV entity who run the operations and O&M	• Higher savings due to consolidation of both assets and staff • Organization changes required • Challenge in consolidation of processes and tools especially in multi-vendor scenarios
JV of Assets With Managed Services for Operations	**TMobile + 3UK (UK)**	• Operators jointly build or consolidate their network assets into the JV company • Jointly appoint a managed services provider to run operations and O&M	• Will have to manage the MSP in terms of additional operator responsibilities • Will depend on equipments currently used and the geographic distribution of the same
Wholesale Resellers	**Tele2 (Sweden)** **Lightsquared (US)**	• Multiple operators pool part of their assets together with possible external investors • More suitable for new technology roll out (e.g. 4G LTE)	• Difficult to implement for existing technologies (e.g. 2G) with multiple operators coming together

Globally setting up an independent JV entity as been the main vehicle through which these partnerships have been executed

Country	Involved Parties	Nature of partnership	Equity ownership	Asset Consolidation
Australia	Hutchison 3G	Creation of new entity- 3GIS to manage merged assets	50% both parties	No
	yes OPTUS	No separate entity	50% both parties	Yes
UK	3 T-Mobile	New entity-MBNL (with NSN, Huawei & Erricson as key partners)	50% both parties	Yes
	O2	Creation of new entity-name yet to be decided	50% both parties	Yes
Spain	orange yoigo	Agreements between two to improve coverage		No
Denmark	telenor Telia	JV called TT-Netvaerket	N/A	Yes
Sweden	Telia TELE2	Creation of new entity-Svenska UMTS-nat AB	50% both parties	No

The ownership structure can be either be based on the value of equipment or relative quality

Approach 1: Based on number of towers

This approach determines relative ownership based on the ratio of towers contributed by each party to the new company

Party	No. of Towers	Relative Ownership
Oper 1	8,000	57%
Oper 2	6,000	43%

Approach 2: Based on relative quality of towers

- **This approach is based on a simple valuation of towers determined by the rent and the number of tenants that can be extracted from each tower**
- **The rent that can be extracted is a factor of the tower location: urban vs. rural**
- **The number of tenants that can be supported depends on the tower/site quality. An example of this is as follows:**
  - Roof-top towers (RTT) are assumed to support only 1 tenant
  - Sites with a short tower (<15 m) and little ground space (about 150 sq-m or less) are assumed to support only 1 tenant
  - Sites with an average tower height (15-30 m) and enough ground (150-300 sq-m) are assumed to support 2 tenants
  - Sites with significant tower height (>30 m) and enough ground (>300 sq-m) are assumed to support 3-4 tenants
- **Owned sites would also carry a higher valuation than leased sites**

Telcos need careful planning to mitigate all challenges they may face while implementing Network sharing (1/2)

	Description	Possible Solutions
Commercial	• Probable loss of service level differentiation and unique brand identity • Possible complications in Exit mechanisms • Alignment of business objectives with correct drivers of cost savings; quantification of CapEx and OpEx	• Focus on differentiation in terms of service delivery rather than coverage • Define and make the contracting process robust to entail all the termination clauses • Due diligence on partnership, including its feasibility
Operational	• Different technologies • Different third party vendor agreements and its termination costs could nullify the potential savings • Costs related to re-dimensioning and relocation of network elements • Consolidation of processes and systems between the sharing parties • Misalignment of network and service evolution strategy and time-tables among the operators	• Explore different forms of sharing • Assess the value that current vendors gain out of the sharing contract. For example, sharing offers a vendor unique access to operators, setting the stage for future infrastructure sales • Conduct a thorough due diligence of network penetration, value of assets and potential growth of customer base • Robust program management office to ensure smooth integration of processes and systems

Telcos need careful planning to mitigate all challenges they may face while implementing Network sharing (2/2)

	Description	Possible Solutions
Organizational	• Workforce rationalization and dealing with labor unions • Consensus on shareholding in the new entities	• Plan the organizational transform suited to the particular sharing model being implemented
Regulatory	• Possible bottleneck due to regulatory restriction in sharing of network assets such as spectrum • Possible regulatory action due of monopolization of market (asset consolidation of top two players)	• Work together with the regulator (MCMC) to set appropriate policies and controls

There is a need for strong program management to coordinate the activities for network sharing

In Summary

- **Network sharing** offers a **high potential** for telecom operators in Malaysia to **cut costs, optimize investments and improve margins** allowing them to focus on catering to the capacity demand

- However, **Malaysian market** (and its operators) is **lagging behind** in terms of network sharing as compared to other markets with similar maturity and its **imperative** for operators to embrace this ASAP

- Network sharing is a **complex undertaking** with multiple different forms of sharing, multiple parties involved which **poses several** commercial, operational, organizational and regulatory **challenges**

- Hence, its important for operators to have an **open dialog** among each other and have robust **joint program management** teams to execute such deals and derive the appropriate benefits