
**ITU/BDT Regional Economic and Financial Forum of
Telecommunications/ICTs for Latin America and the Caribbean
UIT/BDT Foro Regional sobre Economía y Finanzas de
las Telecomunicaciones/TICs para América Latina y el Caribe
Nassau, Bahamas 21-22 April/Abril 2015**

**International Mobile Roaming:
The ITU cost analysis technical paper and tool for NRAs**

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AGENDA

- **Introduction – the roaming issue today**
- **Development of cost model – the basis of roaming costs in the MNO – wholesale and retail**
- **Use cases for roaming**
- **Gathering the information for the cost model: Surveying MNOs with a questionnaire on costs**

Does a cross-region call (eg in the EU) really cost so much more than a DOMESTIC national call for voice or data?

Domestic Charge
•calling party pays

Roaming Charge

- Up to 4 times domestic or more
- BOTH calling and called party pay

The Roaming Issue Today

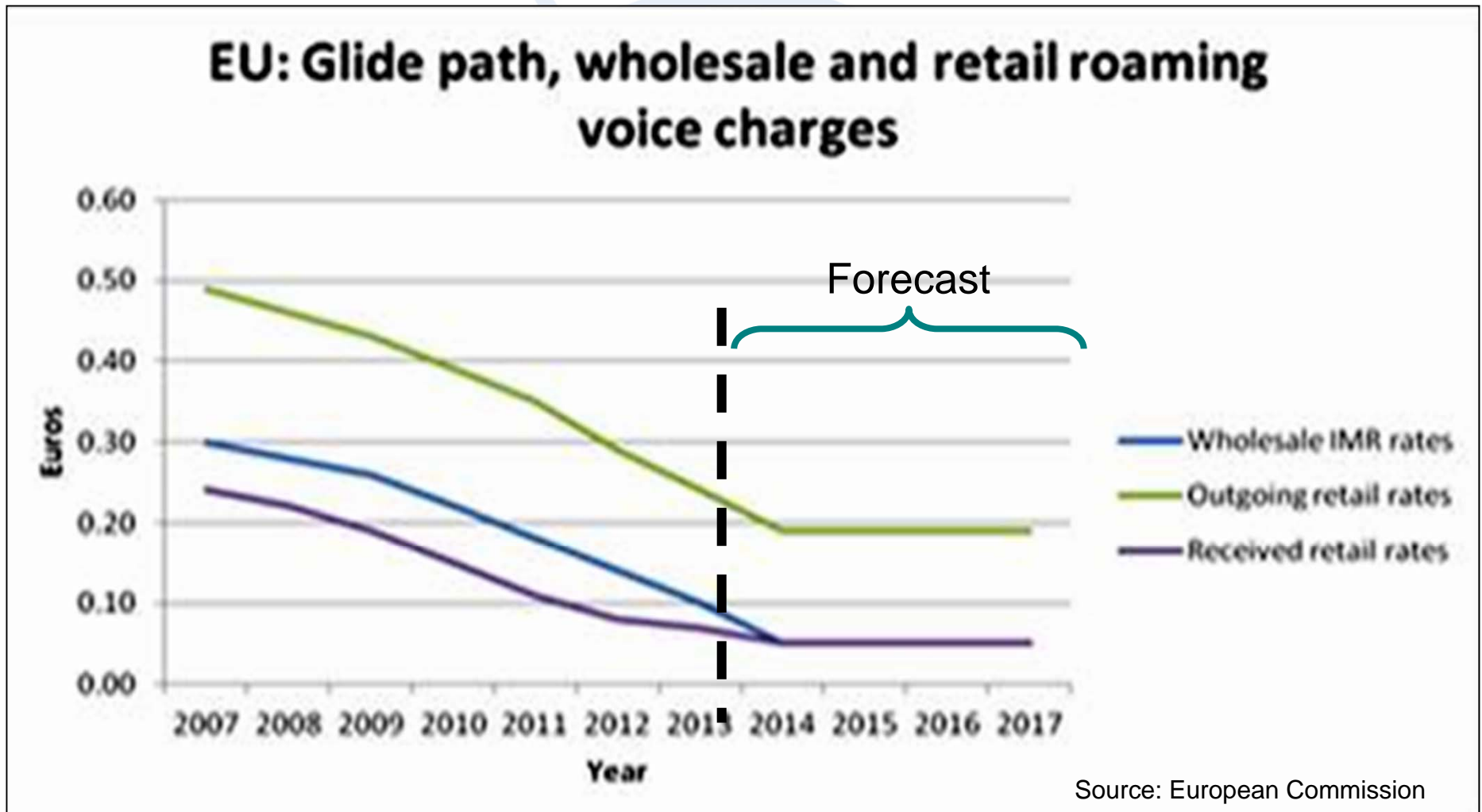
- **International Mobile Roaming incurs additional charges that too often are not cost based but instead random and arbitrary in levels of retail tariffs.**
- **Action by regulators to counter overcharging for IMR requires that NRAs understand the real MNO cost-basis for roaming - wholesale and retail**
- **In practice a simple form of forensic accounting is needed to analyse the IMR cost structure and activity at an international level**
- **To understand both the national MNO costs and those within the international wholesale IOTs (inter operator tariffs) requires international co-operation – probably among a group of NRAs – perhaps across a region – and then further.**
- **IMR also relies on inter-MNO negotiation and co-operation in which wholesale tariffs may be divorced from underlying costs. The net effect is to reduce the efficiency effects of competition**
- **In an epoch when subscribers, and the economy increasingly depend on cost-effective mobile communications, any such charges should be cost justified, or else both the citizen and the economy suffer- an additional tax on the economy.**
- **Note that any counter-measures, by their nature, must be multi-country.**

The Roaming Issue Today, Cont'd

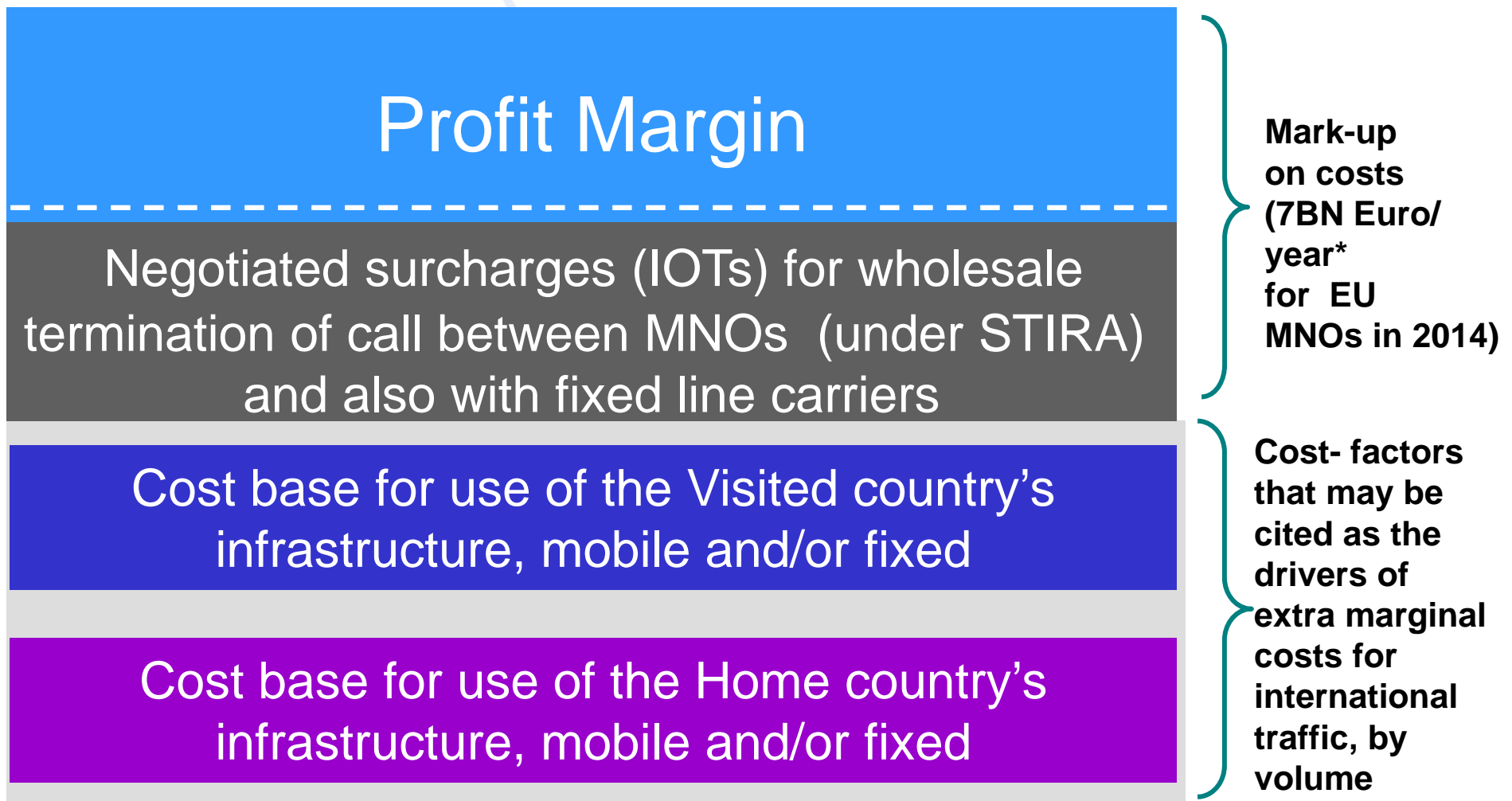
- Asking MNOs to act responsibly has had little or no affect (in the experience of the EU).
- In consequence, regulation for price caps may be necessary – as the EU has found in its various caps on roaming progressively implemented since 2007.
- It may be useful to find a realistic estimate for a target level for the additional cost of roaming above the domestic tariff
- This could be aimed at as the maximum limit – which is the model the EU uses - of progressive caps on roaming charges
- Here, build on the success of ITU-T Recommendation D-98* and subsequent other ITU Recommendations on the way, to move towards a standard ITU cost model for IMR and thus eventually - cost-based IMR tariffs worldwide.
- AND if there is interest, further work using the model with MNOs may indicate maximum levels that could be targeted for the IMR on-cost over domestic tariffs – which in the long term may have a 'glidepath' towards zero.

* D- 98 (09/2012) Series D, General Tariff Principles: Charging in International Mobile Roaming

THE RESULT – One example: EU Roaming – a history of moving towards cost-oriented pricing for International Mobile Roaming (IMR)



The financial structure of MNO roaming tariffs



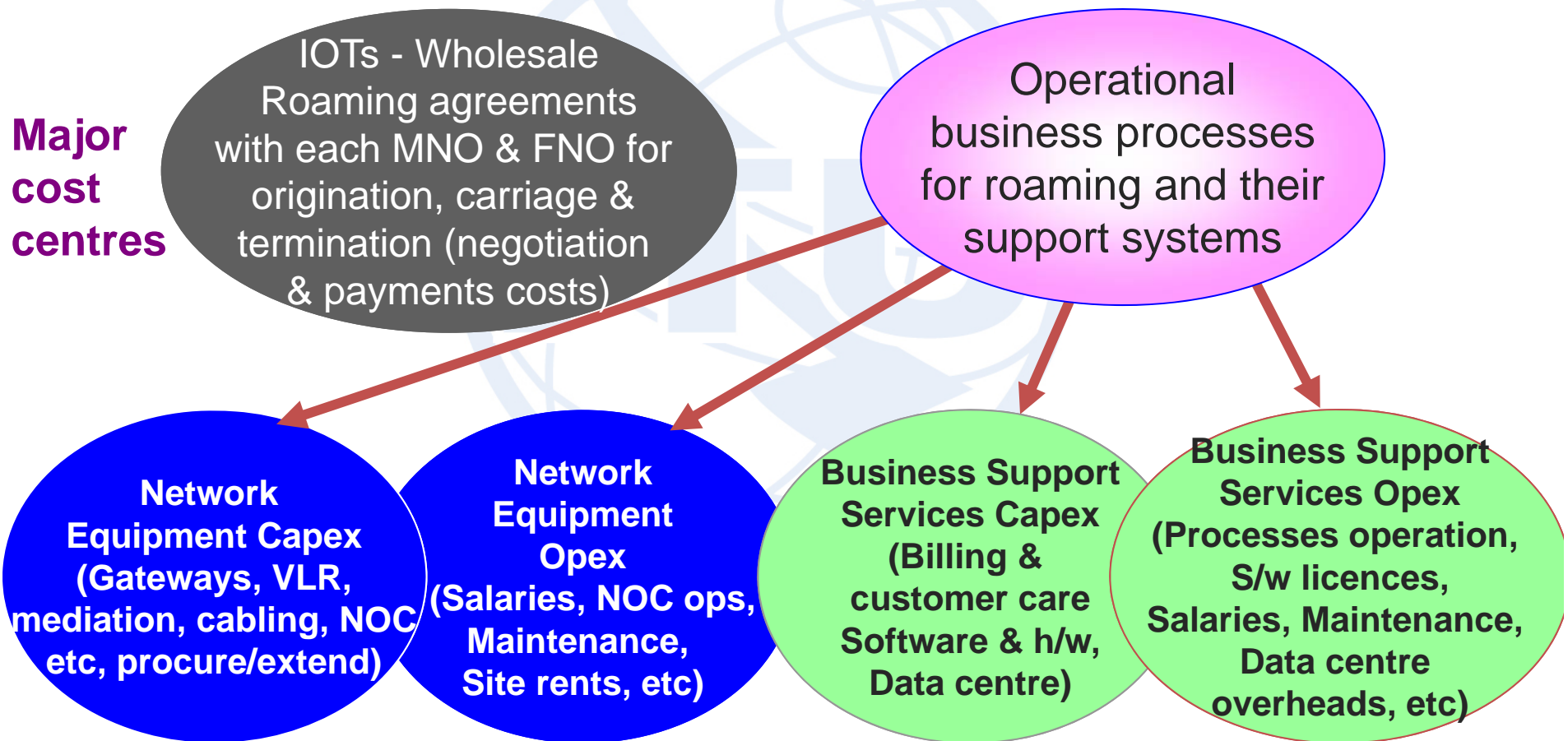
*MNO estimates from Orange, Vodafone, O2, 12 Sep 2013

STIRA – Standard Terms for International Roaming Agreements IOT- Inter-Operator Tariff MTR -Mobile Termination Rate

International roaming involves the following cost centres

- which are extensions of existing domestic network operational systems

So roaming costs should be just an additional *fraction* of domestic costs



MNO= Mobile Network Operator, FNO= Fixed Network Operator

VLR= Visiting Location Register, NOC =Network Operating Centre, & systems

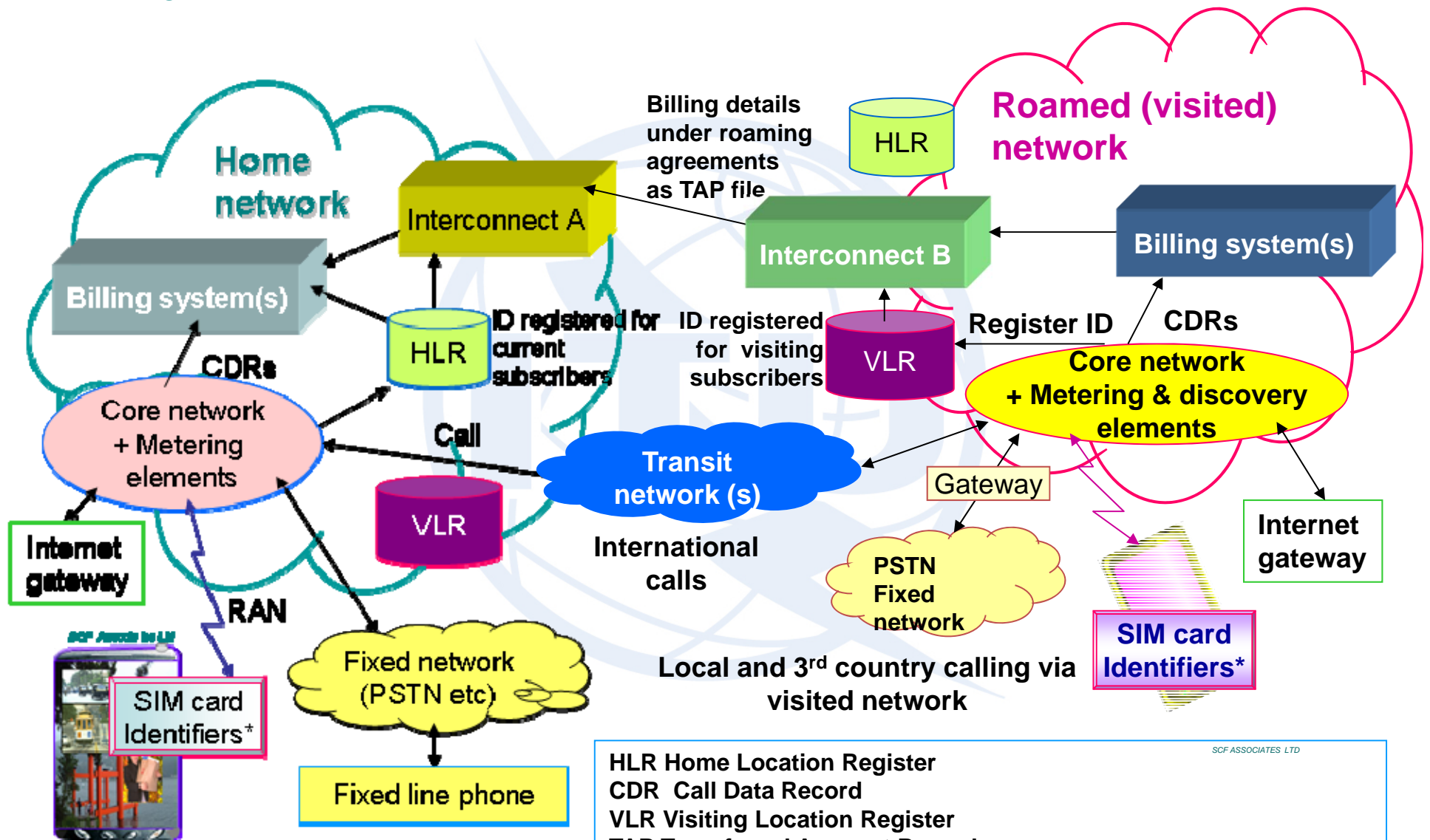
Roaming costs

International roaming involves the following activities for equipment, systems and operations:-

- Identification and verification
- Collection/ transport of call data records (CDRs) with costs of retail billing for roaming subscribers; may include specific real-time systems (e.g. for pre-paid customers) such as CAMEL;
- Interconnection & transit infrastructure costs for international calls & payments to transit carriers;
- Payments for call termination for visited MNO, at wholesale prices, with discrepancy resolution;
- Associated additional home network and business systems costs;
- Costs of negotiation/upkeep of roaming agreements
- For prepaid may also use a local recharge hub, or some agreement to use local recharge cards for roaming top-up

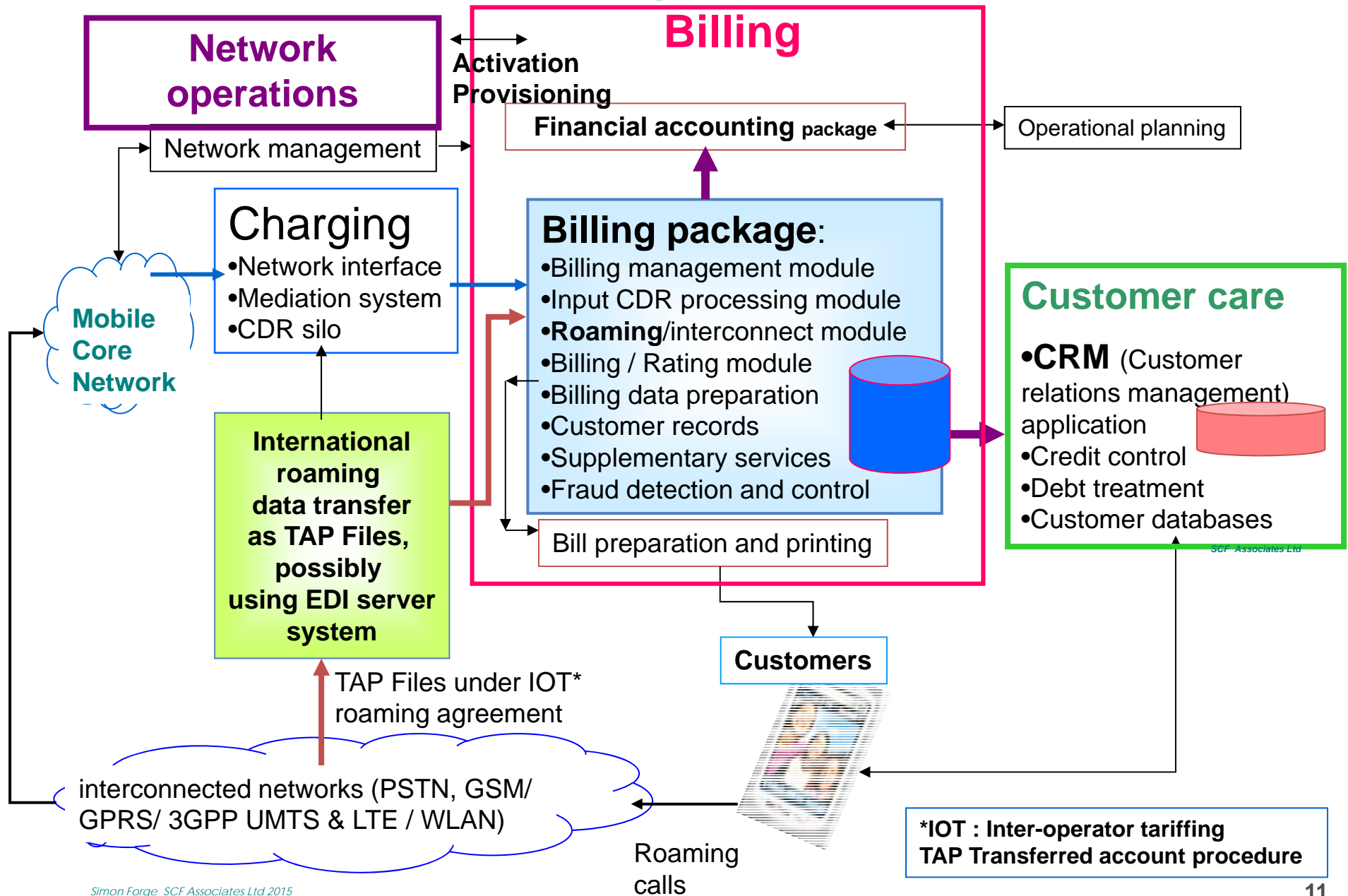
Plus a slice of SG&A costs – proportional shared costs of company operations

Simplified mobile roaming infrastructure follows standard roaming architecture (UMTS/ GSM)



HLR Home Location Register
 CDR Call Data Record
 VLR Visiting Location Register
 TAP Transferred Account Procedure
 SIM Subscriber Identification Module
 * Specifically IMSI - International mobile subscriber identifier

Inside each MNO – there are the charging, billing and customer care business processes in the BSS



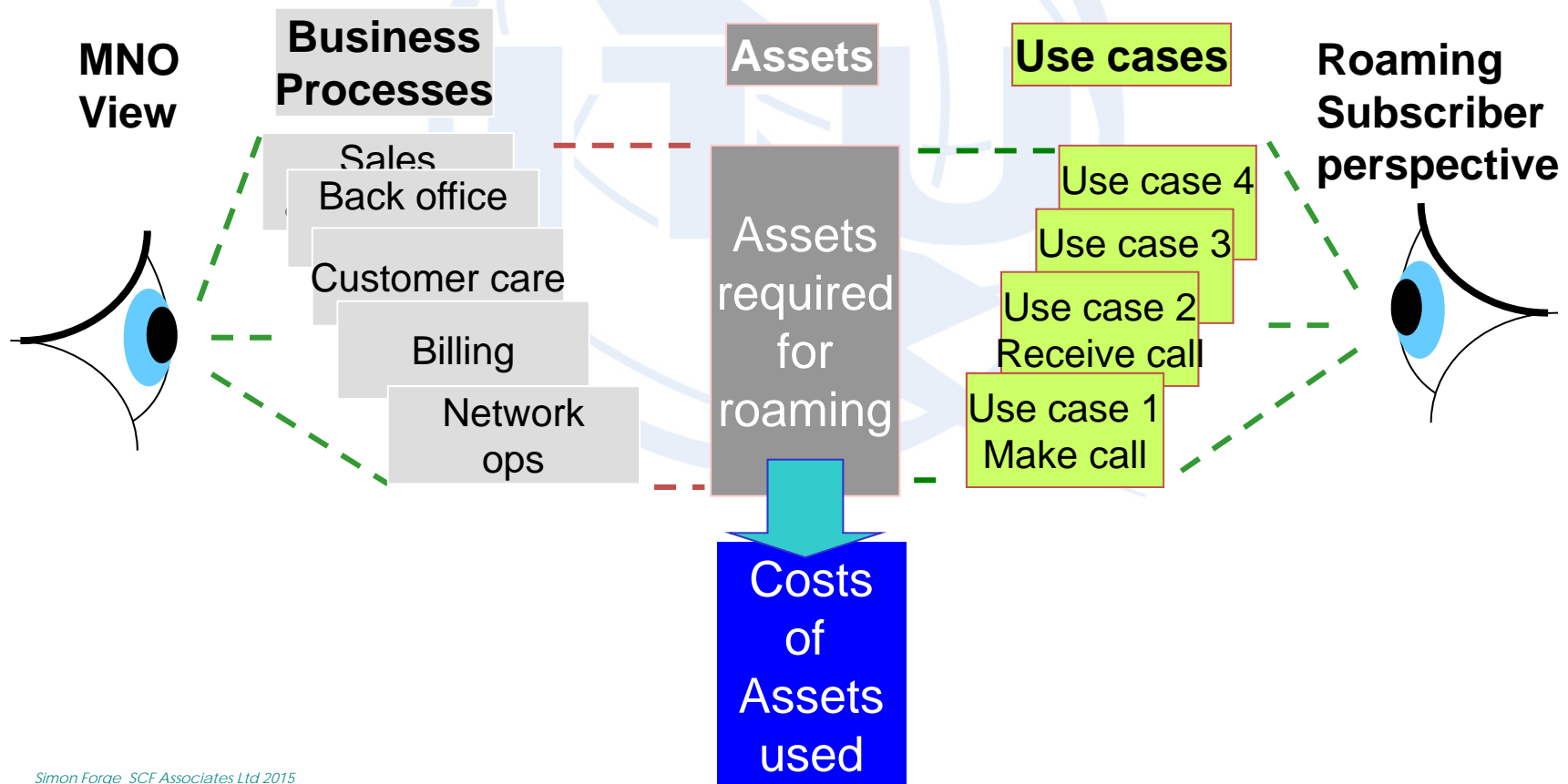
Should this technical infrastructure cause far higher roaming costs than domestic?

- The core issue is whether IMR calls have a different & higher cost structure than national “offnet” calls i.e. calls terminated on another network nationally
- Reasonable to expect increased network & support systems for IMR capacity
- The nature of these extra costs is for network and billing systems to cover international call transport, with wholesale invoicing and retail billing
- Questionable whether cost differences are large for this type of increment in operational load over that required for a *national increase in traffic minutes*.
- *Likely that any increase is a fraction not a multiple of current national real costs*
- Further investigation requires empirical cost accounting analysis with a cost model that is MNO and technology neutral.

The basis of the cost model:

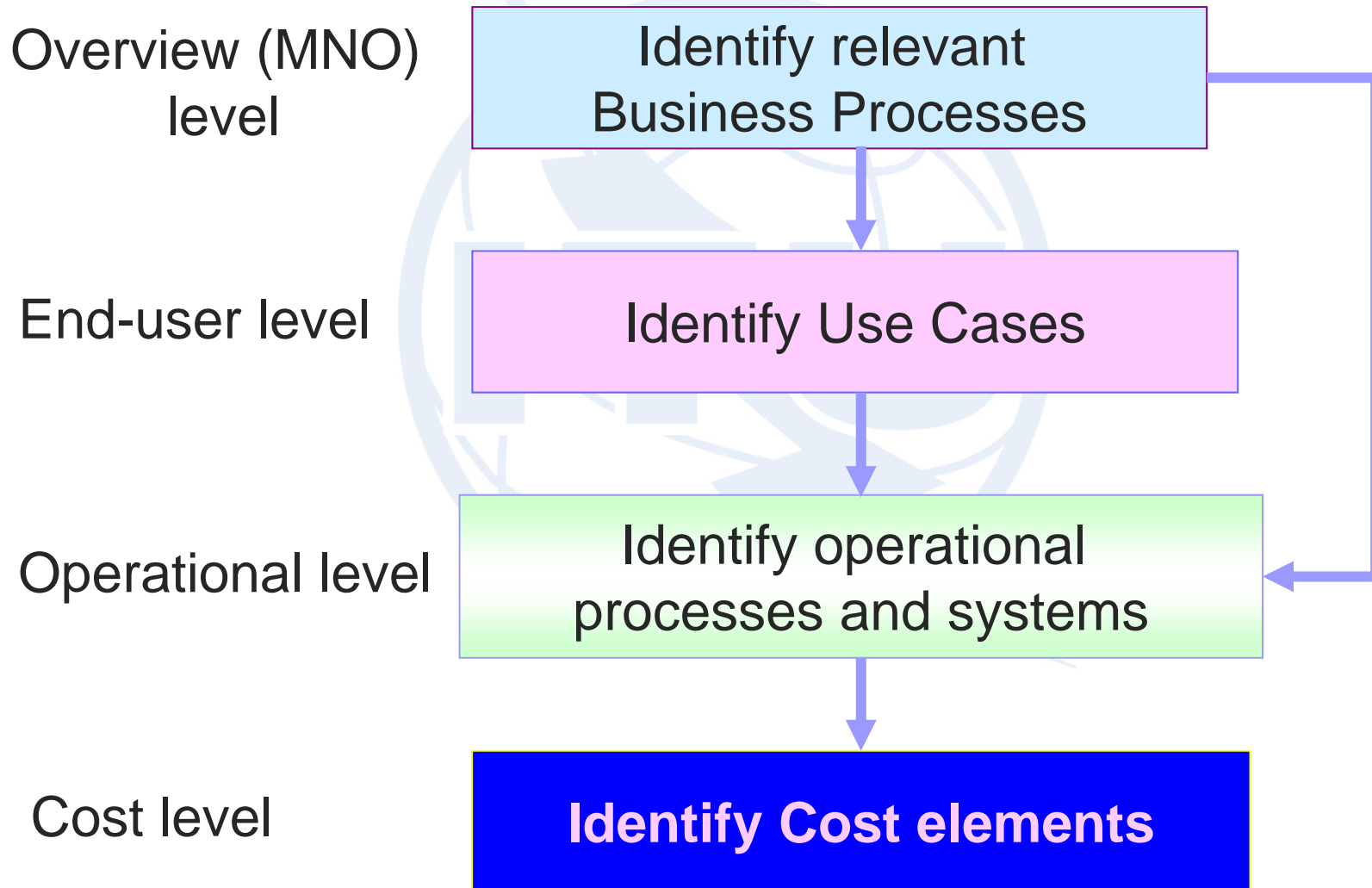
identifying which actions and assets roaming demands via USE CASES drawn from actual behaviour:-

- To define the business processes, with staff and support infrastructure with its software / hardware
- And therefore to identify the cost structures of IMR services with the elements,



Costing identification mechanisms used in the roaming cost model

- A pragmatic ABC-type approach



An MNO runs on business processes

that are defined by the subscriber needs for using the mobile comms network, with its business support services, and all the business operations

The major business processes for the MNO:-

- Acquire assets including real estate for BSTs, network equipment, IT systems, data centres, etc
- Build network
- Rollout network services and value added services – eg mapping, Apps Store, etc
- Operate networks and services
- Acquire subscribers
- Register subscribers
- Activate subscribers
- Provision subscribers
- Retain subscribers
- Billing for domestic and roaming services - plan, build, train, operate, maintain
- Customer care – services and infrastructure – plan, build, train, operate, maintain
- Handle network management, including repair teams - plan, build, train, operate, maintain
- Manage logistics for network elements
- Manage logistics for retail sales channels, especially handset inventory and supplier contracts
- Acquire, equip and manage tied or owned retail outlets
- Marketing, with promotions, handset subsidies, etc
- Sales, with contracts and/or prepaid
- Accounts, with accounts payable and payroll
- International negotiations for roaming agreements
- Regulatory negotiations and policy with spectrum acquisition

Each business process will breakdown into subsidiary or component business processes, defined in aggregated mode through the user experience, often via ‘use-cases’

Key business processes for the roaming phases

Handle sign-up when arrive in visited country

Common USE-CASES that define the roaming business processes

1 Place call inside visited country a) to another mobile, offnet or on-net or b) to a fixed line subscriber

2 Place call to home – a) to a mobile or b) fixed termination

3 Receive call from home, a) from a mobile, or b) fixed source

4 Place call while in visited country to a 3rd country a) to a mobile or b) to a fixed termination

For voice, data and SMS

Return to home network and sign -up

For analysis of the International Mobile Roaming service cost structures –

Use Case 1: Roaming mobile call made within visited country

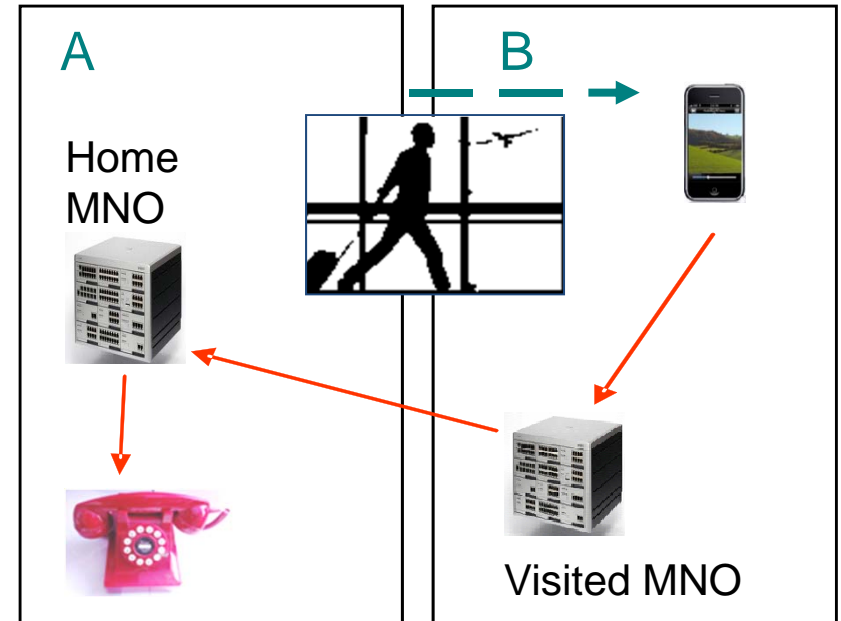
Call type	Cost elements	Use Case Illustration
<p>A traveller from Country A goes to Country B and makes a call to a subscriber in country B</p> <p>Roaming mobile call made within visited country to local subscriber</p>	<ul style="list-style-type: none"> • Mobile origination in country B • National transit in country B • Mobile termination in country B • Roaming specific costs – (technical & operational) eg authentication and authorisation with home MNO • Retail specific costs (technical & operational) 	<p>The diagram illustrates the roaming mobile call process. It is divided into two main sections: Country A and Country B. In Country A, a subscriber is shown in their home country, connected to the Home MNO Network Infrastructure. In Country B, the subscriber visits (roams) and makes a call to a local subscriber. The diagram shows the subscriber's phone in Country B connected to the Visited MNO Network Infrastructure. A red arrow labeled 'Verification signalling' points from the Visited MNO Network Infrastructure back to the Home MNO Network Infrastructure, indicating the process of authentication and authorization. Another red arrow labeled 'Local Subscriber' points from the Visited MNO Network Infrastructure to a local subscriber's phone in Country B. A green arrow at the top indicates the subscriber's movement from Country A to Country B, and a blue arrow shows the call path from the subscriber in Country B to the local subscriber in Country B.</p>

Use Case 2: Call from visited country back to home country

A traveller from country A goes to country B and makes a call back home to a subscriber in country B.

Call type

International call back to home country from visited country



Cost elements

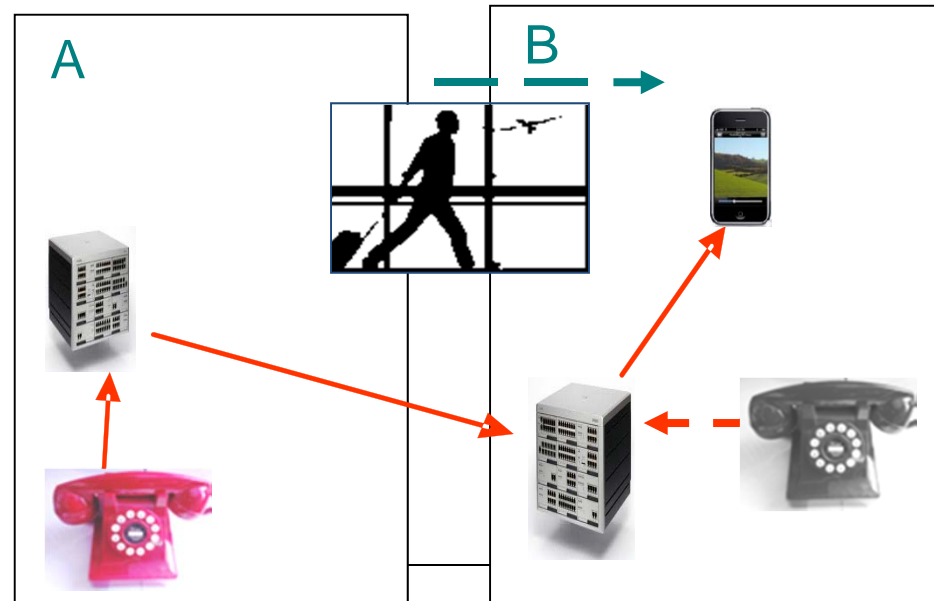
- Mobile origination in country B
- International transit
- Mobile or fixed termination in country A
- Roaming specific costs (technical & operational)
- Retail specific costs (technical & operational)

Use Case 3: Receiving a call in a visited country (from home or visited country)

A traveller from country A goes to country B and receives a call - from *either* of the countries A or B – so may be a local or international call

Call type

Incoming call while roaming that originates from home country, or, from inside the visited country, and may come from a mobile or a fixed line phone



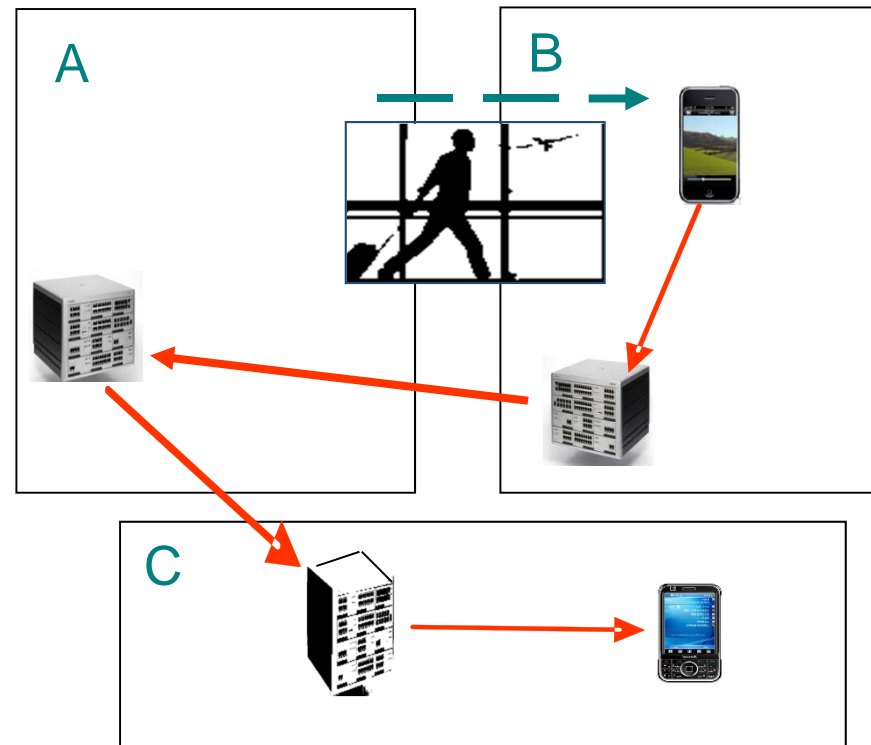
Cost elements

- Mobile termination in country B
- Possible International transit
- Roaming specific costs (technical & operational)
- Retail specific costs (technical & operational)

Use Case 4: Call to a third country while roaming

A Traveller from country A goes to country B and makes a call to a subscriber in country C.

Note that country C may or may not be in a region where international roaming prices are regulated.



Call type

Call from inside a visited country to a third country

Cost elements

- Mobile origination in country B
- International transit
- Mobile origination in country A
- International transit
- Mobile or fixed termination in country C
- Roaming specific costs (technical & operational)
- Retail specific costs (technical & operational)

The process of using the cost model

- Effective data gathering is the core activity – ie the data collection process and interacting with MNOs:-
 - Negotiations with MNOs - dealing with roaming issues
 - Interviews – the data collection process - a sample questionnaire for NRAs for use with the cost model
- Organisation of data from MNOs
- Standard format for final report

Information Requirements for the Cost model: obtain the underlying costs of roaming

- To make comparisons :- gather BOTH **domestic retail** rates and **roaming retail** rates for visited countries - for voice, SMS & mobile data services
- Accumulate data for both **prepaid** and **postpaid**
- Gather both **domestic wholesale** rates and **roaming wholesale** rates for voice, SMS and mobile data services
- To see how roaming traffic levels are changing – collect the historic traffic volumes, for domestic and roaming, for voice, SMS and mobile data services (eg over 2 years by quarter) so can compare.

The Questionnaire survey process

- Select most suitable 4 or 5 MNOs for first piloting the data gathering exercise – ie, the most likely to respond, where feedback will be rapid and complete (ie good relationship with NRA and well organised internally, with comprehensive accounting)
- Pilot test the questionnaire and spreadsheets with the selected MNOs
- Analyse pilot survey returns
- Use lessons learnt from feedback to improve the questionnaire before proceeding to information gathering from all relevant MNOs across the visited MNOs
- Proceed to full survey of all relevant MNOs

There are also questions for the NRA to consider

Objective of these questions is to judge whether NRAs are in a position to gather and use the relevant costing information and so implement a *“Roam Like a Local”* framework:-

- For wholesale roaming prices that **domestic MNOs are charged by visited MNOs** - can the NRA **obtain** the **wholesale** pricing information?
- For the wholesale roaming prices that **domestic MNOs can charge out to foreign MNOs** – can the NRA obtain the **wholesale** pricing?
- Has the NRA the authority to **share information with NRAs** from other countries?
- Has the NRA the authority to **regulate retail roaming prices** charged by domestic MNOs to their roaming subscribers?
- Does the NRA have the authority to **regulate wholesale roaming prices** charged by domestic MNOs to visited MNOs?

What is needed to go forward ?

- **Formulate an international mobile roaming strategy**
- **GO Global:-**
 - **Endorse a common roaming cost model globally as a first step to understanding the situation**
 - **Introduce enforcement - progressive price caps**
 - **Implement processes for enforcement:-**
 - **Global recommendations** on methodological principles
 - **Global Recommendations** to enforce roaming price caps

International Mobile Roaming: The ITU cost analysis and tool for NRAs



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