KPMG Consulting

COMMUNICATIONS + CONTENT

Principles, Scope, Charges and Challenges in Interconnection

Trevor Jordan

ITU Regional Regulatory Seminar UIT
Dalian, China
5 – 8 August 2002

- Traditional View of Interconnection
- The Forces of Change
- Possible Outcomes

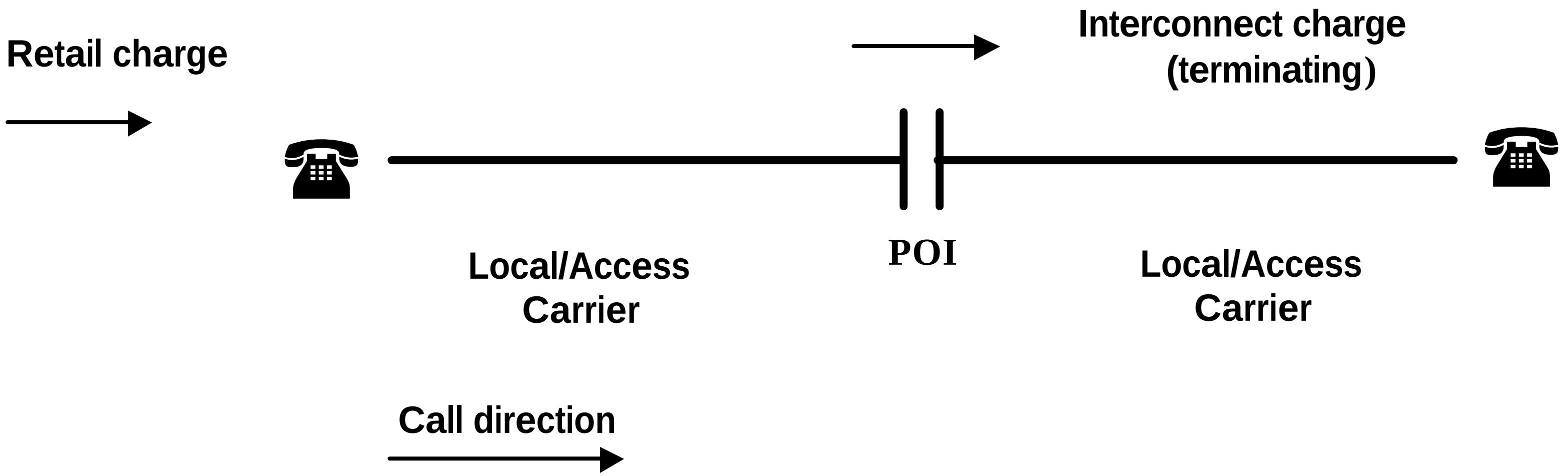
Origins of Interconnection

- International (co-operative) interconnection has existed since the middle of the 19^{th} Century – a major motive for the creation of the ITU
- The break up of AT&T in 1984 created domestic within the USA
- Local (competitive) interconnection developed during the 1990s
- Interconnection arrangements in a competitive environment generally require regulatory intervention while those in a co-operative environment generally do not
- Principles and models are well established

Purpose of Interconnection

- **To provide universal connectivity so that any party can communicate with any other where technically practicable**
- **To open up parts of the telecommunications market to competition by providing access to infrastructure and services that either cannot be replicated or are uneconomical to replicate**
- **These are separate and distinct objectives and often require different approaches**
- **Two different interconnection models**
  - Simple interconnection
  - Bypass interconnection

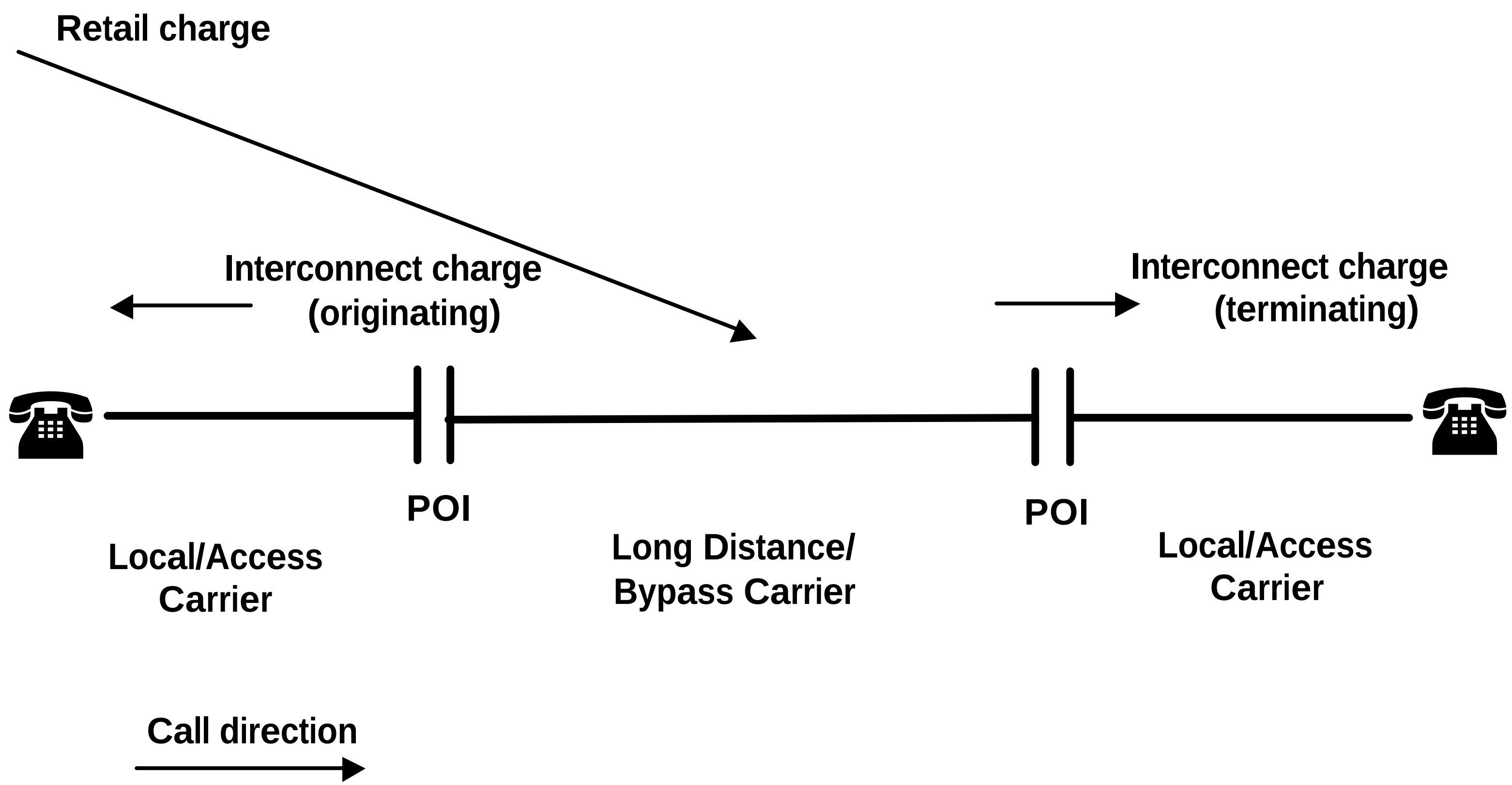
Simple Interconnection



Used for the interconnection of mobile services and fixed services for local calls

POI: Point of Interconnection between two carriers

Bypass Interconnection



Used for the interconnection of
long-distance calls

POI: Point of Interconnection between two carriers

Points of Interconnection

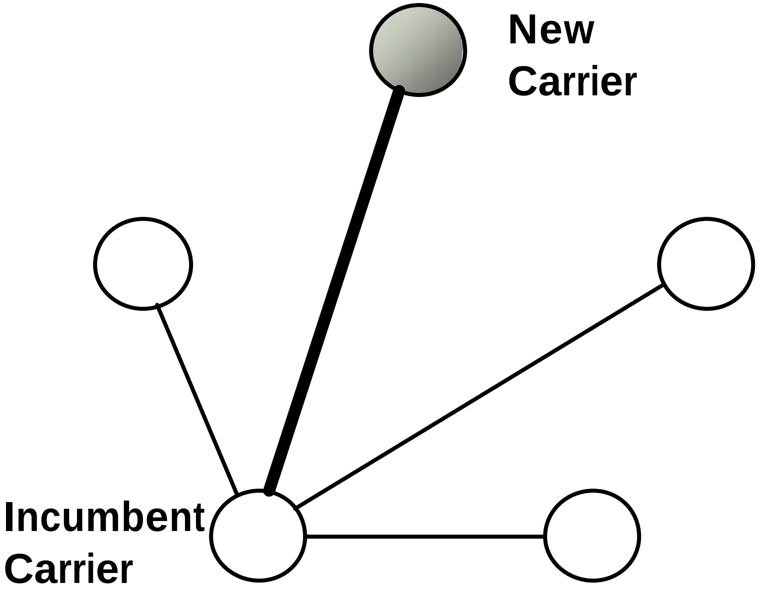
- **POIs are not normally very complex technically**
  - May be just a demarcation point
  - Filtering and control may be implemented in the signalling system for network integrity
  - Interconnection charging system is often the most complex element
- **The location of a POI is largely an economic issue**
  - Driven by the costs and capabilities of the technology and the volume of traffic
- **A balance of the fixed and variable costs**
  - Fixed cost of an interconnection point – more POIS will increase fixed costs and reduce variable costs
- **Different carriers have different interconnection requirements**

A favourable interconnection environment is essential

- **Fast agreements with incumbents**
  - Speed is more important than ‘perfect prices’
  - Standard contract provisions should be available
- **Fast delivery**
  - Provisioning of connections
  - Conditioning of numbers and access codes
- **Transit carriage**
  - Avoids the complexity, delay and cost of interconnection with multiple incumbents - may have to be imposed on major carrier
- **Fast response from regulator when required**

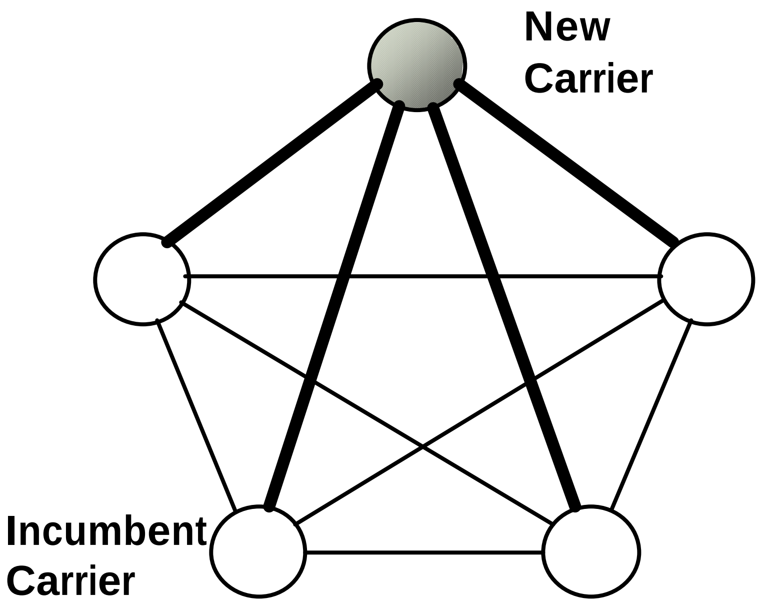
Transit Carriage

With Transit Carriage



1 interconnection

Without Transit Carriage



4 interconnections

Role of the Regulator

- **The objective is to create competition in the market not to create the market outcome**
  - Encourage commercial agreements
  - Intervene when justified – not to every request
  - Monitor public interest and intervene when necessary
  - Do not eliminate competitive uncertainty
  - The Regulator as an arbitrator - transparency might not be desirable
- **Price is not the only issue**
  - Speed is often more important than price to a new carrier
  - Move quickly and often – move gradually (not slowly) towards the objective
- **Every regulatory intervention has undesirable outcomes as well as the desired effect – a matter of balance**
  - Favourable conditions for long-distance competition will often discourage local access competition

Market Changes

Market changes are creating new issues for interconnection

- Unit costs are reducing dramatically
- Technology costs are reducing
- Capacity is increasing
- The market power of incumbents is decreasing
- Mobile and internet services growing rapidly
- The importance of the PSTN is diminishing

Interconnection Charging Structures

There are numerous interconnection charging structures

- **Time based charges**
- **Volume based charges**
- **Capacity based charges**
- **Bill and Keep (no charges)**
- **A multitude of combinations of the structures above**

Time Based Charges

- **Takes the form of a charge per minute or second of use**
  - Probably the most commonly used approach at present
  - The cost of connecting the interconnection links to the other party's switch and the cost of the interconnection links may be charged separately or they can be bundled into the time based charge
- **Requires elaborate call recording system**
  - Simple time recording provides no mechanism for audit or dispute resolution – often both parties will implement call recording systems on each end of the interconnection link
  - Call recording is required if there are peak/off-peak charges
- **Can distort the retail market**
  - Most costs are fixed rather than variable, so timed interconnection charges are a surrogate which can entrench non-optimal behaviour – there may be little incentive to exploit under-utilized capacity and interconnection charges may rise if volumes fall

Volume Based Charges

- **Takes the form of a fixed price for a quantity of call minutes (or MB) during a specific period**
  - Essentially a volume discount on time based charges
  - Eliminates the scope for peak/off-peak charges
  - Creates an incentive to utilize committed call volumes
- **Requires elaborate time or call recording system**
  - Simple time recording provides no means for audit or dispute resolution – often both parties will implement call recording systems on each end of the interconnection link – can be unnecessarily expensive
  - Extensively used for the Internet and well suited to the purpose
- **Can distort the retail market**
  - Little incentive to exploit under-utilized capacity during off-peak periods
  - Some incentive to exploit committed call volumes

Capacity Based Charges

- **Takes the form of a fixed charge for a certain amount of capacity**
  - Increasingly appropriate as traffic volumes increase, interconnection takes place at lower levels within the network and the level of traffic dependent costs reduces
  - Used mostly for Internet connections at present
- **Requires no call or time recording system**
  - Simple periodic payments based on capacity provided
- **Good reflection of network fixed costs**
  - Allows the interconnecting carrier to optimize its use of the network by eliminating the incremental cost of usage – encourages peak/off-peak retail charges
  - Provides the interconnected carrier with network and financial certainty

Bill and Keep

- **No interconnection charges – each party keeps its own retail revenue**
  - Works when traffic levels are the same or very similar in each direction and the costs are very similar for both networks
  - Normally used for the interconnection of local calls on the PSTN where these conditions are likely to be met - could be used between mobile networks
  - A special case of capacity based charges where there is symmetrical interconnection between similar networks
- **Requires nothing except an agreement**
  - No financial transactions and no interconnection budget
  - Very fast network implementation – suits new entrants
  - In practice, calls or traffic levels may be measured or sampled to confirm that the original assumptions continue to be met – reduces some of the implementation cost advantage
- **Interconnection charges do not impact on the level and structure of retail prices**

Current Charges

Australia

- **Fixed network origination and termination ~1.5 cents/min**
  - Plus connection and access costs – the cost of the port into the interconnected carrier's switch and the cost of the link between the two networks
- **Mobile network termination ~25 cents/min**
  - Plus connection and access costs
- **Internet ~30 cents/MB**
  - Plus connection and access costs
- **Internet ~$2,500 per month for 1Mbit/s**
  - Plus connection and access costs
  - Equates to ~10 cents/MB at full utilization
  - Equates to about 33% utilizaton

Two distinct configurations of mobile service with different interconnection arrangements

City Licence (Receiving Party Pays)

- North America, Hong Kong
- Similar to wireless local loop
- Local number; local charging
- Mobile user pays similar long-distance and international charges to fixed network, plus
- Mobile user pays airtime charge for both incoming and outgoing calls

Regional Licence (Calling Party Pays)

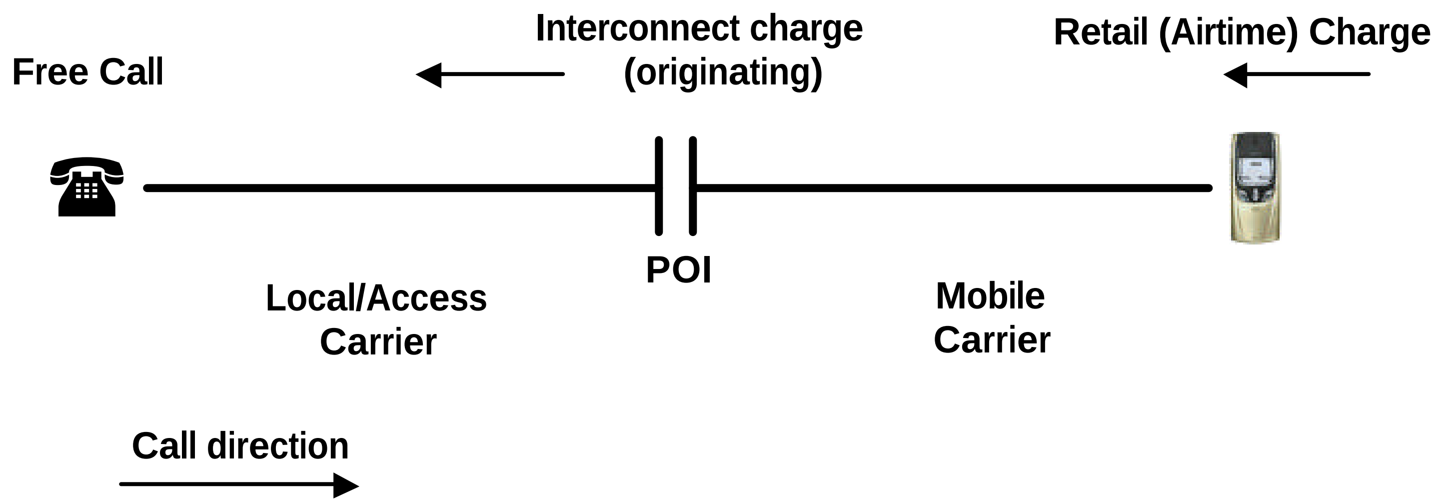
- Europe, Australia
- Regional/national number; national charging
- National charging system – generally one rate for calls to and from (and between) mobiles - with no unbundling of long-distance component for calls from mobiles
- No mobile charges for incoming calls

Mobile - Receiving Party Pays

KPMG Consulting

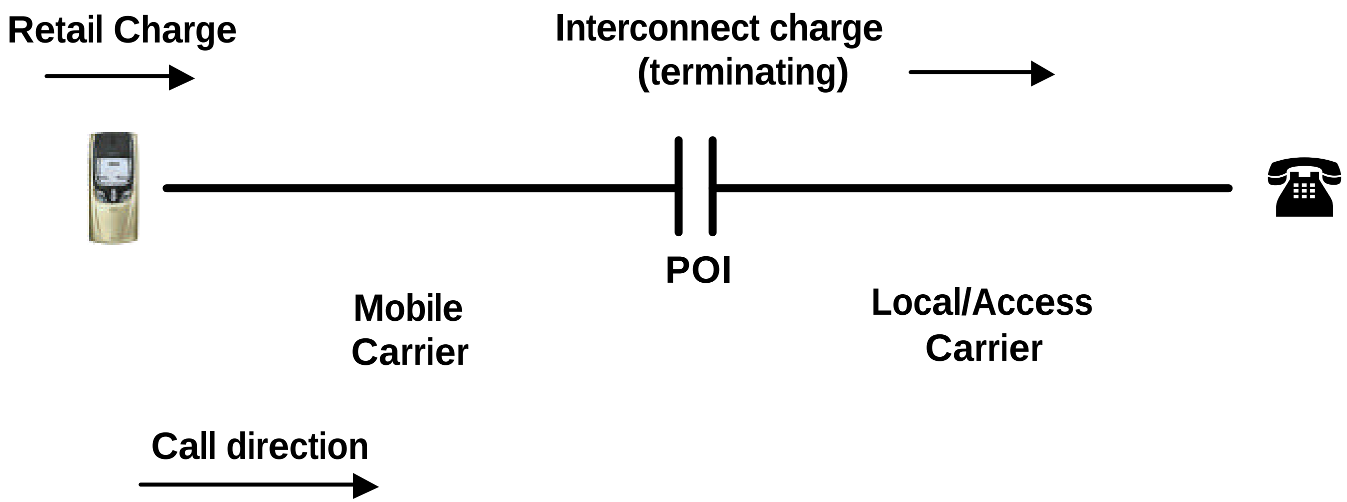
COMMUNICATIONS + CONTENT

Fixed to Mobile



Mobile - Receiving Party Pays

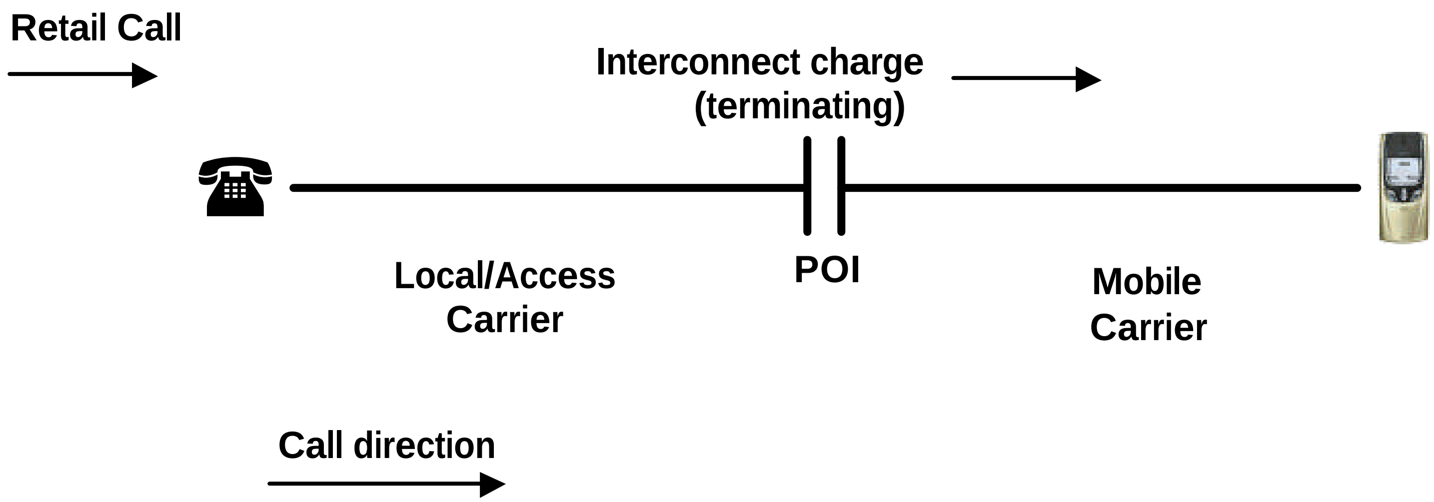
Mobile to Fixed



Asymmetrical arrangement – the interconnect charges always flow from the mobile network to the fixed network regardless of the direction of the call – symmetrical only in the case of zero charges (bill and keep) – effectively a cross-subsidy from mobile to fixed services

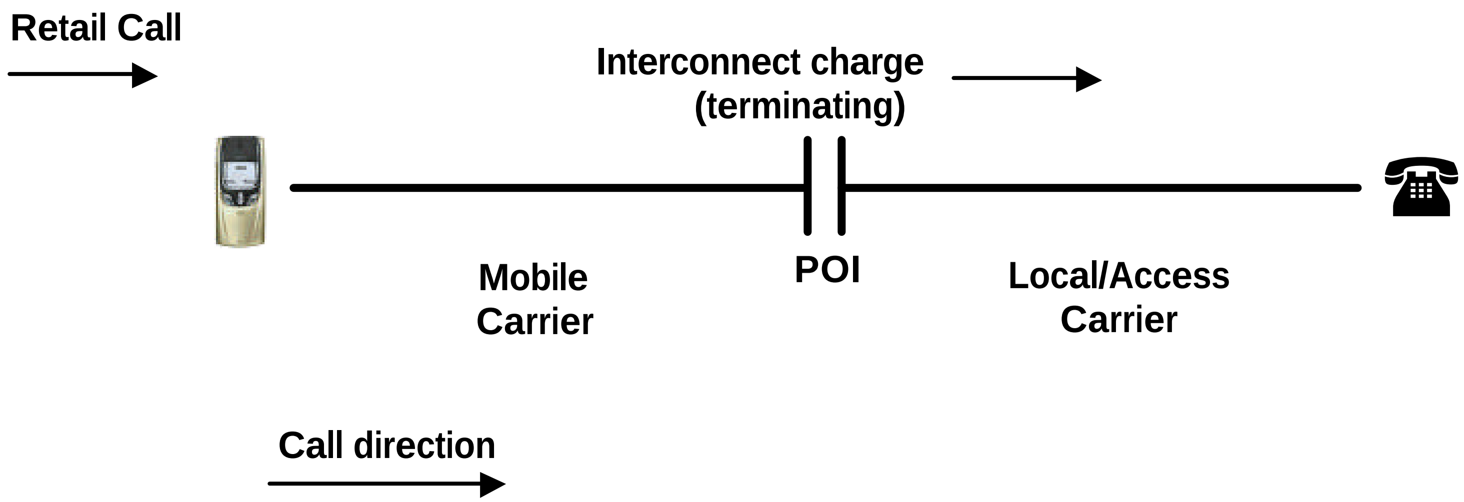
Mobile - Calling Party Pays

Fixed to Mobile



Mobile - Calling Party Pays

Mobile to Fixed



Symmetrical arrangement - however the interconnection charges are generally not identical for fixed and mobile networks

The Current Challenges

- **Mobile terminating charges**
  - Mobile charges are still substantially higher than fixed network terminating charges
- **Local interconnection**
  - Fixed network interconnection has generally been at a higher level of the network than the local exchange (switch)
  - The size and geographic coverage of the local exchange is increasing substantially
  - New local network carriers are increasing the level of interconnection traffic
  - Direct connections to local exchanges can be justified

Mobile Terminating Charges

- **Charges are still very high (US cents per minute, source: Ovum February 2001)**

Austria	13.5	Belgium	16.9	Chile	24.9	Denmark
12.1	France	18.0	Finland	14.8	Germany	16.3
Ireland	13.3	Italy	1.2	Mexico	25.8	Netherlands
20.0	New Zealand		18.8	Norway	10.3	Peru
20.5	Spain	20.6	Sweden	12.3	Switzerland	20.5

  - Typically a factor of 10 to 20 greater than fixed network terminating rates – this is not to suggest that they should be identical
  - High interconnect charges underpin/justify high retail call charges
  - Seems to be a phenomenon of Calling Party Pays environments

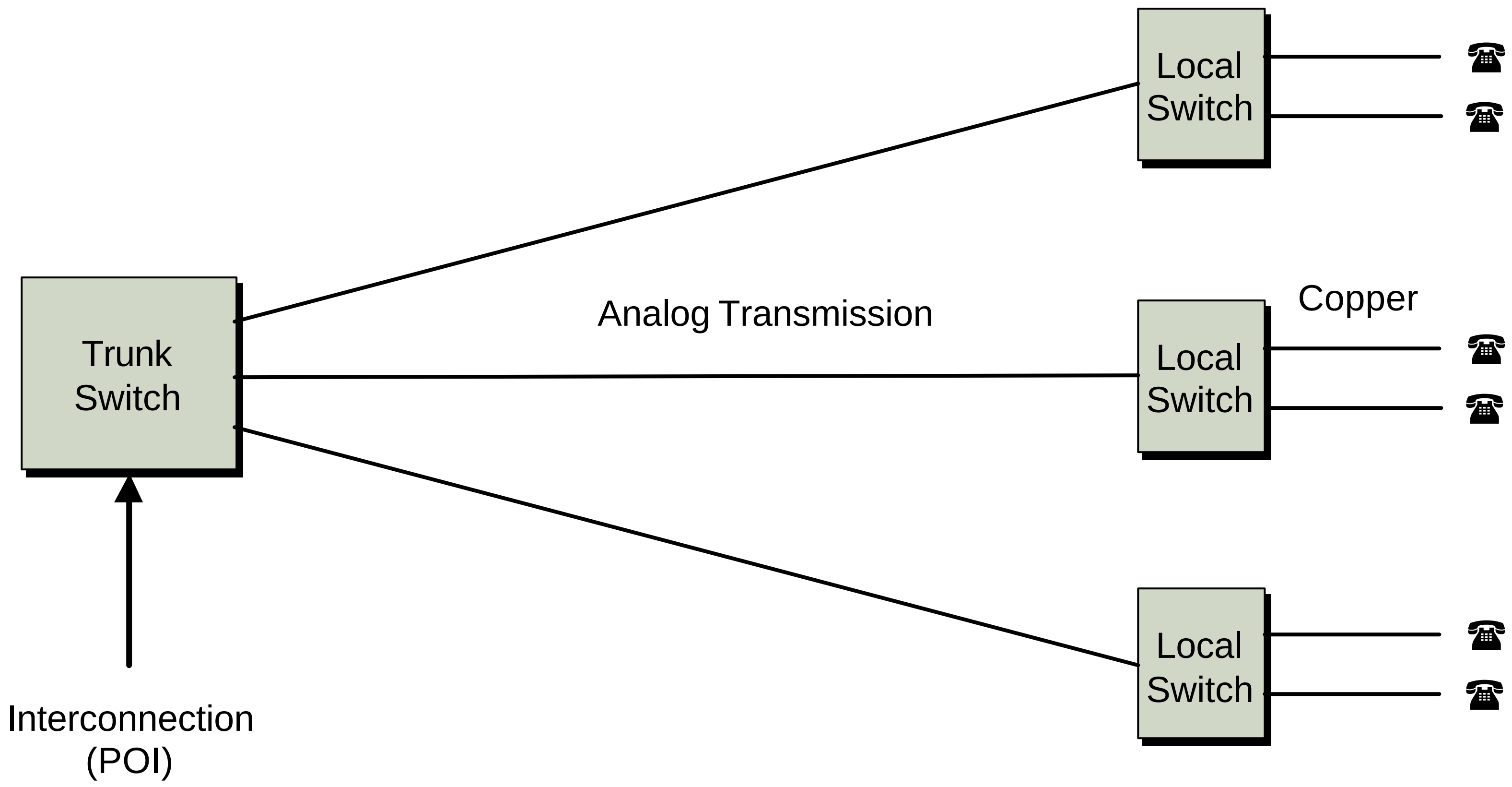
- **Little competitive pressure to force them down**
  - Mobile carriers have largely balanced traffic so the mobile to mobile interconnect charges balance. Large net payments are made from the fixed network operator(s) to the mobile network operators because of the disparity in charges.

Local Interconnection

A need to provide interconnection at the local exchange level

- **Networks have generally connected at trunk exchanges**
  - Often only one in each major city
  - More than one interconnection point might be provided for network integrity and reliability – but still at the trunk exchange level
- **Local exchanges are increasing size**
  - Technological change
  - Network simplification and reduction in operational costs
- **Interconnection traffic volumes are increasing**
  - Increases in competitive long-distance
  - Emergence of competitive local access (also inhibition of local access)
  - Interconnection traffic for each local exchange is reaching a level which

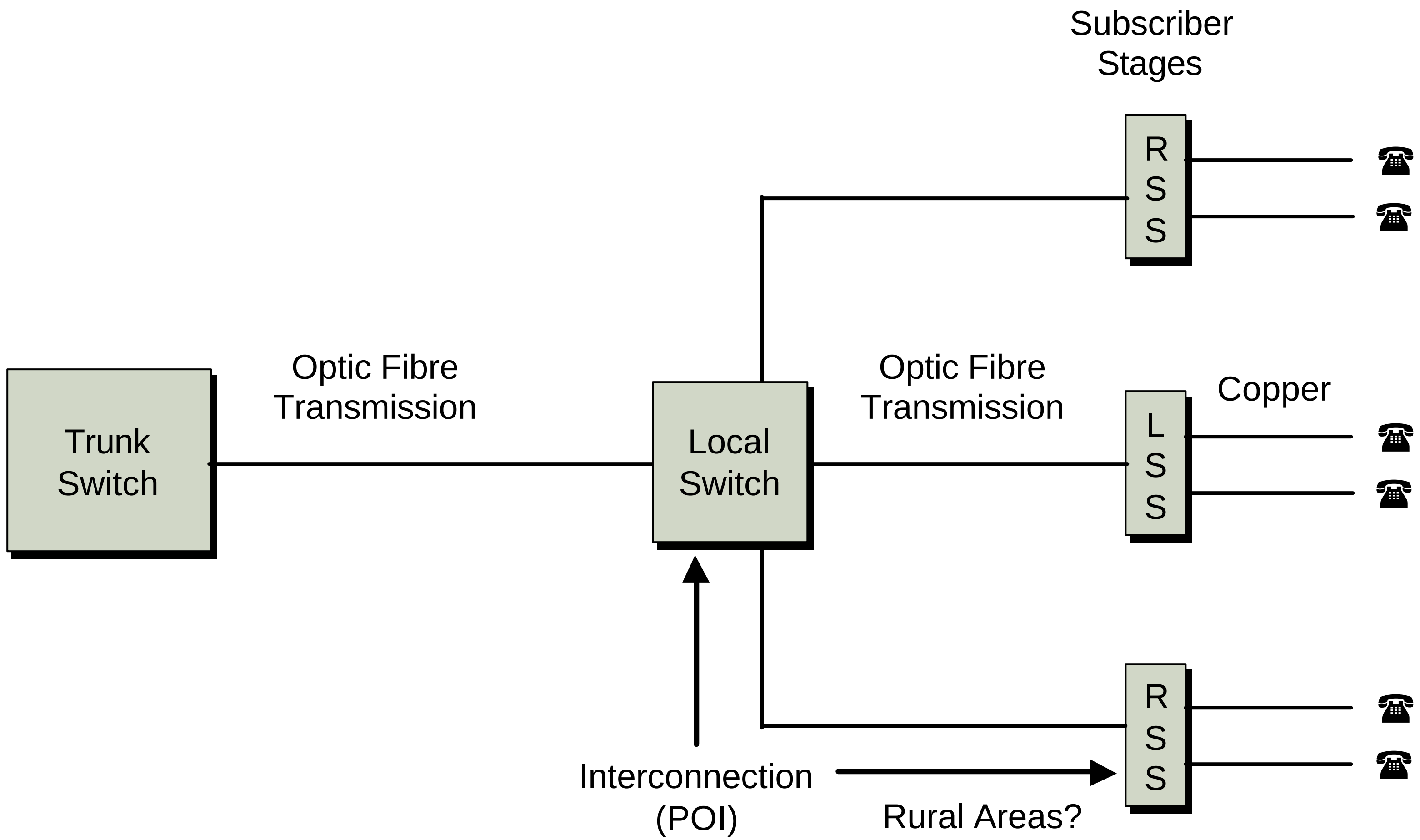
Local Network Evolution



Local Network Evolution

KPMG Consulting

COMMUNICATIONS + CONTENT



Local Interconnection

- **Interconnection was more economic at the trunk exchange level**
  - Aggregation of traffic to economic levels
  - Cost of providing interconnection service

- **A major cost of interconnection was the implementation of the interconnection charging system**
  - Each switch required a call recording and charging system
  - This raised the threshold level of traffic for the economic provision of interconnection

- **A new approach to interconnection is required**
  - Most of the cost within a local exchange is fixed and not traffic dependent
  - Much of the cost of providing interconnection in an exchange is a result of variable (time based) interconnection charges
  - Change to fixed interconnection charges and reduce the cost and complexity

Where will we be in ten years time? (2012)

- **No long-distance product as we currently know it**
  - Distance charges will be compressed - pushed by declining costs and Voice over IP – telephony will be a diminishing part of total data communications
  - Fixed (low) price per minute for all distances
  - No retail long-distance service
- **Rapidly declining number of fixed telephone services**
  - Substitution by mobile, broadband Internet and fixed VoIP services
- **Mobile services will dominate telephony**
  - All persons of phone-bearing age will have a mobile service
- **Dial-up Internet will be gone**
  - Broadband (~1Gbit/s) will be provided by DSL and optic fibre
  - Narrowband (1 to 10Mbit/s) will be provided by wireless

Future Interconnection

KPMG Consulting

COMMUNICATIONS + CONTENT

- **Long-distance bypass and carrier preselection will be gone**
  - Simple interconnection will be the standard model
- **Mobile networks will be the focus of interconnection**
  - Mobile networks will directly interconnect and the interconnection between the fixed and mobile networks will diminish in importance
- **Many networks will be built on an IP transmission structure**
  - Interconnection will become IP based to avoid unnecessary conversions to circuit based interfaces between IP based carriers
- **An IP transit network might be the basis of interconnection**
  - The dominant mobile network or perhaps an independent specialized transit network (which might develop from the declining fixed network)

Trevor Jordan

Trevor Jordan is a consultant specializing in telecommunications regulation, particularly in the areas of access and interconnection. He has advised both the technical and the economic regulators in Australia on interconnection issues, has supported new entrants in access negotiations with the incumbent carrier, and has worked on behalf of new carriers on industry self regulation issues, such as mobile number portability.

He has provided support to those regulators in the mediation and arbitration of disputes and has been an expert witness in interconnection disputes. He has also provided advice to various national governments on the deregulation of their telecommunications markets and the introduction of competition.

Mr Jordan has worked in the telecommunications industry for more than twenty five years in a variety of fields. He has worked on regulatory issues for much of that time.

From 1992 to 1996 he was the inaugural regulatory manager of the interconnect unit at Telstra where he was responsible for liaison with the regulator on interconnection matters. During that period he was directly involved in the development and negotiation of the initial access agreements with the new carriers and he successfully managed four major interconnection disputes on such diverse issues as preselection, special services and network modernization.

During 1997 and1998 he worked at the Media and Telecommunications Policy Group of the Royal Melbourne Institute of Technology analysing the access and interconnection aspects of the new Australian telecommunications regulatory regime. He has published several papers on access and interconnection and presented at international conferences.

He has a Bachelor of Engineering and a Graduate Diploma in Law from the University of Melbourne and is a Fellow of the Institution of Engineers, Australia.

Contact Details

KPMG Consulting

COMMUNICATIONS + CONTENT

- ☎ **+61 3 9288 5008**
- **+61 3 9288 5564**
- **+61 413 880 220**
- GPO Box 4902W, Melbourne, Victoria 3001, AUSTRALIA
- **trevor.jordan@kpmgconsulting.com**
- **trevor@jordan.name**