# INTERNATIONAL SURVEY OF INTERCONNECTION POLICIES

**First Updated Report**

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## Section 1. Introduction

Liberalization of telecommunications markets worldwide has created the need to interconnect rival networks. The network rivalry generally involves an incumbent service provider and one or more new entrants. The incumbent may be a private company that formerly had a monopoly for telecommunications services, or a government ministry that was formerly a monopoly and is now somewhere on the path to corporatization or privatization. Interconnecting networks is necessary to ensure that customers of one network are able to communicate with customers of other networks. Because the incumbent's former monopoly position provides it with all existing customers at the start of market liberalization, interconnection with the incumbent is the most critical interconnection that entrants face and is the focus of most interconnection debates.[2]

Prices and terms[3] for interconnecting with incumbents have been the most controversial interconnection issues. Prices are controversial because they affect profitability and the development of competition. In general, higher interconnection prices are thought to favor incumbents because higher prices preserve or enhance incumbents' revenue streams and raise entrants' costs. Conversely, lower interconnection prices are thought to favor entrants because lower prices mean lower entry costs, allow entrants to use incumbents' networks and pay less than what it would cost the entrants to build their own networks, and decrease incumbents' revenues. Terms for interconnection are controversial because they define what it is that service providers receive when they obtain interconnection with another provider's network. For example, terms that require an entrant to obtain interconnection at a high level in the network hierarchy forces an entrant with an extensive network to purchase more transport and switching than is necessary.[4]

The interaction between prices and terms is also important to profitability and competition. For example, higher interconnection prices favor incumbents only as long as incumbents are able to exercise market power over the new entrants. Given sufficient time, low entry barriers, and terms that allow interconnection close to customer locations, entrants can bypass uneconomically high prices by building their own networks. On the other hand, lower interconnection prices provide incumbents with an incentive to improve profits by maintaining higher market shares in the more lucrative retail markets. Incumbents may try to maintain these higher market shares by offering only restrictive interconnection terms.

Despite the importance of interconnection prices and terms, only recently have there been efforts to systematically collect and analyze worldwide data on interconnection policies.[6] As an initial step to fill this void, the Public Utility Research Center (PURC)

conducted a survey of interconnection policies. This survey included literature and document searches, and a formal survey of non-U.S. regulators.

This report updates the earlier research findings. Specifically, additional data are from NTT, the European Union (EU), and the Asia-Pacific Economic Cooperation (APEC). We continue to find that countries are implementing a diverse mix of telecommunications interconnection policies. The US and the UK appear to have the most aggressive policies, tending to adopt policies that would generally be seen as favorable to new entrants. Most countries require service providers to negotiate interconnection agreements, but the number of issues open to negotiation varies considerably. When negotiations fail, most (but not all) countries have the regulator intervene.

Regarding prices, OECD countries are generally adopting cost-based or cost-oriented standards for prices, but the prices that result from these policies vary greatly. The Baumol-Willig rule has emerged only in New Zealand (although it has since been replaced by lower prices), although Uganda and Columbia could be seen as having something in the spirit of the Baumol-Willig rule.

The remainder of this report has three sections.

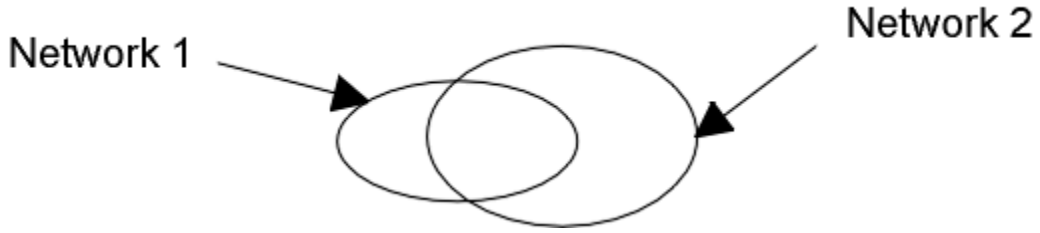
- Section 2 – Types of Interconnection explains the types of interconnection found in the research.
- Section 3 – Results reports the data collected.
- Section 4 – Conclusion examines patterns, contrasts results with other studies, and suggests further research.

## Section 2 Types of Interconnection

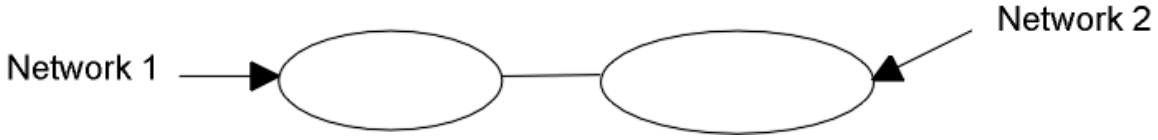
This project examined prices and terms for domestic telecommunications. It did not examine settlements and interconnection for international calling. The focus was on traditional voice services because these services continue to provide a large majority of telecommunications revenues even though data and information services are increasing in importance.

Where available, this project collected data on the following types of interconnection:[7]

1. Wireline to Wireline
2. Wireline to Mobile
3. Mobile to Wireline
4. Mobile to Mobile
5. Long distance to Local
6. Between competing or overlapping networks -- This includes interconnections between a mobile network and a wireline network serving overlapping geographic areas. It also includes interconnections between wireline networks whose areas overlap, or between mobile networks whose areas overlap.




7. Between non-competing networks -- This includes, for example, interconnections between a local network and a long distance network.




## Section 3 Results

This section provides the results of the survey and other research. There is one subsection for each country for which data were collected. Data reported include the regulatory authority, the process for determining interconnection prices and terms, allowed Points of Interconnection (POIs), the settlements process, and the interconnection prices.

### Australia

*Regulator*
The Australian Competition and Consumer Commission (ACCC) is the economic regulator. The Australian Communications Authority (ACA) is the technical regulator. This is a recent change. Previously, Austel was both the economic and technical regulator. As part of a general move to centralize economic regulation in Australia, recent legislation eliminated Austel and divided its responsibilities between the ACCC and the ACA.

*Process for Determining Interconnection Prices and Terms*
Under Australian law, the first step in the price-setting process is for the ACCC to establish a service description. Then the service providers negotiate prices and terms. If negotiations fail, the ACCC settles the dispute using Telstra's approved undertakings.

Telstra is the incumbent service provider. As of the time of this report, the ACCC was reviewing Telstra's proposed undertakings for the fixed network (Public Switched Telephone Network or PSTN), digital mobile (GSM), and analogue mobile (AMPS).[8] In evaluating Telstra's proposed undertakings, the ACCC is applying previously developed pricing criteria. These criteria are discussed below.

*Points of Interconnection*
Service providers negotiate POIs. In general, interconnection is allowed at any level of the switching hierarchy.

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.

*Interconnection Prices*
The ACCC's standards for interconnection prices include whether the prices are consistent with the prices Telstra charges itself for the same or similar services and the Commission's incremental cost standard. The ACCC's incremental cost standard is Total Service Long Run Incremental Cost (TSLRIC).[9] ACCC will also make international comparisons of the prices in the undertakings to those for similar services.[10]

Appendix A, Tables 1 and 2 provide Telstra's proposed undertakings prices for PSTN and AMPS interconnection.[11] Table 1 shows the prices in Australian dollars. Table 2 shows the prices in U.S. dollars.[12] Telstra's undertakings proposal contains no usage charges for GSM interconnection. The proposal states that these prices are to be negotiated.[13]

**Austria**

*Regulator*
Bundesministerium fuer Wissenchaft und Verkehr is the regulator.

*Process for Determining Interconnection Prices and Terms*
The process was not described.

*Points of Interconnection*
POIs were not described.

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.

*Interconnection Prices*
Appendix A, Table 3, shows interconnection prices in Austria.[14]

## Belgium

*Regulator*
Ministry of the Economy and of Telecommunications is the regulator.

*Process for Determining Interconnection Prices and Terms*
The process was not described.

*Points of Interconnection*
POIs were not described.

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.

*Interconnection Prices*
Appendix A, Table 3, shows interconnection prices in Belgium.[15]

## Bolivia

*Regulator*
The Superintendency of Telecommunications is the regulator.

*Process for Determining Interconnection Prices and Terms*
The process was not described.

*Points of Interconnection*
POIs were not described.

*Settlements Process*
Currently, each company bills its own customer and pays interconnection. The long distance company (ENTEL) pays interconnection to the local service providers and to the other mobile service provider (TELECEL). ENTEL also provides mobile service. Previously, ENTEL paid TELECEL 27.5% of the total long distance bill for mobile calls originated by TELECEL customers.

*Interconnection Prices*
Appendix A, Table 3, shows interconnection prices in Bolivia. TELECEL's prices paid to local service providers are not shown. In general, they are higher than the prices ENTEL pays.[16]

## Canada

*Regulator*
Canadian Radio-television and Telecommunications Commission (CRTC)

*Process for Determining Interconnection Prices and Terms*
The CRTC regulates interconnection prices in Canada by approving or rejecting prices that service providers propose for essential facilities and selected other facilities. Essential facilities are components of an incumbent service provider's telecommunications network that competitors cannot reasonably supply on their own.[17] According to the CRTC, essential facilities in Canada include local lines in small urban and rural areas.[18] The CRTC will regulate other facilities if these other facilities' availability and pricing will, in the opinion of the Commission, affect the development of competition. These other facilities include all other local lines, transiting of traffic, and Common Channel Signalling System 7 (CCS7).[19] Transiting of traffic is the carrying of traffic between other carriers' local networks, including wireless networks. CCS7 is a network signalling system that transmits information to various parts of the network to facilitate call completion and various call features. Once prices are accepted, they are kept in the company's tariffs that are on file with the Commission.

*Points of Interconnection*
The CRTC requires all local exchange companies (including new entrants) to establish a single POI in each local exchange. This POI serves as a gateway for traffic exchange.[20] The interconnecting companies are required to establish circuits between their POIs and to share equally the costs of these circuits. The Commission requires that these trunks be two-way whenever possible to simplify traffic measurement.[21] The CRTC also requires companies to interconnect for CCS7.[22] Incumbent local exchange companies are required to provide a CCS7 POI in each numbering plan area (NPA).[23]

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.

*Interconnection Prices*
The CRTC requires that interconnection prices be 25% above cost estimates from cost studies that follow Commission-prescribed formulas.[24] When a service provider has submitted its cost studies and proposed prices, the CRTC reviews both and either accepts the proposed prices or directs the provider to submit new prices. The new prices are to comply with conclusions the Commission has reached regarding the cost studies, how the proposed prices relate to the cost studies, or other policy matters.

The CRTC's prescribed cost formulas are from its Phase II decisions regarding cost measurement. These decisions require providers to estimate the net present value of cost and revenue streams caused by specific services.[25] Phase II costs include costs for provider of last resort obligations,[26] but do not include contributions to subsidies for line rental. Subsidies for line rental are to be collected from long distance companies, submitted to a subsidy administrator, and distributed to providers chosen by subsidized customers.[27]

Appendix A, Table 4 shows the interim interconnection prices established by the CRTC. Table 5 shows the prices proposed by Bell Canada. Table 6 shows Bell Canada's prices for allowing wireless service providers to connect with Bell Canada's wire network.[28] Prices are expressed in both Canadian and U.S. dollars.

The CRTC requires competing local exchange companies to not charge each other for terminating traffic. This arrangement is called bill and keep. Bill and keep means that each provider bills its own customers for calls these customers make and keeps all of the revenues. Providers may develop a mutual compensation system if traffic is not balanced for a significant period of time. This compensation would be based on the incumbent's prices for essential facilities. New entrants may not charge compensation prices that are higher than the incumbent's prices. [29]

## Colombia

*Regulator*
Comision De Regulacion De Telecomunicaciones

*Process for Determining Interconnection Prices and Terms*
In Colombia, per-minute interconnection charges are regulated differently than prices for other elements of interconnection, such as capacity charges and equipment rental. The Commission sets per minute interconnection prices and keeps them on file at the Commission. Cellular, long distance, and local interconnection have different prices. Service providers negotiate the other interconnection prices and keep them in their contracts, but the providers must follow Commission requirements for non-discrimination and equal charges.

*Points of Interconnection*
Interconnection is allowed only at central tandems.

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own service provider. Normally, providers settle accounts monthly. In the case of cellular, cellular providers pay the local fixed service provider. In the case of long distance, the local fixed service provider collects all of the money and gives the long distance provider the amount that is left over after deducting access charges.

*Interconnection Prices*
The Commission established the current per-minute interconnection prices by benchmarking against other countries.[30] For the longer term, the Commission plans to use forward looking incremental costs. Appendix A, Table 3 contains the interconnection price for cellular.

## Costa Rica

*Regulator*
Direccion de Regulacion de Telecomunicaciones

*Process for Determining Interconnection Prices and Terms*
The regulator establishes interconnection prices in Costa Rica. The types of interconnection actually provided are limited because competition is not yet allowed.

*Points of Interconnection*
The national service provider establishes transit centers or POIs where interconnection may occur.

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.

*Interconnection Prices*
In general, prices are based on the national service provider's incremental cost of the additional traffic to the existing network, including any capacity additions that are required. Appendix A, Table 3, contains current interconnection charges. Interconnection initiation fees are based on case-by-case cost studies.

## Croatia

*Regulator*
Croatia is currently developing its regulatory framework.

*Process for Determining Interconnection Prices and Terms*
Statutory laws and service provider concession agreements establish the rules for interconnection. According to these rules and current practices, providers negotiate interconnection prices and maintain contracts that contain the prices and other terms.

*Points of Interconnection*
Service providers negotiate POIs.

*Settlements Process*
Settlements procedures are not yet determined.

*Interconnection Prices*
Interconnection prices are not yet determined.

## Czech Republic

*Regulator*
The Ministry of Finance has authority over domestic prices.

*Process for Determining Interconnection Prices and Terms*
Operators negotiate interconnection prices and terms. If they come to an agreement, the regulatory authority does not interfere. If they do not agree, then they present their proposals and negotiation minutes to the regulatory authority for a decision.

*Points of Interconnection*
Service providers negotiate POIs.

*Settlements Process*
Settlements information was not provided.

*Interconnection Prices*
Prices are supposed to be based on actual costs related to the interconnection, operation of the network, and provision of services. Interconnection prices are not publicly available.

**Denmark**

*Regulator*
The National Telecom Agency Denmark is the regulator.

*Process for Determining Interconnection Prices and Terms*
Service providers negotiate interconnection terms and prices. If no agreement is reached, the regulator mediates. If mediation fails to generate an agreement, then the regulator sets the prices.

*Points of Interconnection*
Service providers negotiate POIs.

*Settlements Process*
Settlements information was not provided.

*Interconnection Prices*
Prices are supposed to be based on Long Run Average Incremental Cost (LRAIC), which is comparable to TSLRIC. Statutory language requiring the use of LRAIC is fairly new, so the government is still in the process of determining how LRAIC will be calculated. Appendix A, Table 7, contains the most recent interconnection prices.[31]

**Finland**

*Regulator*
The Ministry of Transport and Communications regulates interconnection prices in Finland.

*Process for Determining Interconnection Prices and Terms*
Service providers negotiate interconnection prices and terms. Providers with significant market power are required to publish terms of interconnection and make them available to providers requesting interconnection. Unless the Ministry decides otherwise, this includes any changes that are planned to be implemented within the next six months. The service providers with market power are expected to submit interconnection contracts to the Ministry. The Ministry will make these contracts available to the public except for sections that contain sensitive information related to business strategies of the parties.[32]

*Points of Interconnection*
Service providers negotiate POIs.

*Settlements Process*
In Finland's settlements process, all service providers whose facilities are used to complete a call are allowed to collect fees from the customer who places the call, regardless of whether they are the customer's chosen provider. The customer's chosen provider is obligated to either collect fees for these other network providers, or give sufficient information for other providers to bill the customer themselves. This information is primarily the customer's name and address. If the customer's chosen provider has given this information, it may demand that the other network providers collect the fees themselves. [33]

*Interconnection Prices*
Prices and related terms are to be published. Prices are to be reasonable with regard to the costs and may include a reasonable profit. A specific profit level is not defined. The Ministry does not prescribe a cost method or even a definition, but does require telecommunications operators with significant market power to submit a description of the cost calculation system that the company will use. The cost calculation system is deemed approved by the Ministry unless it states otherwise within one month of receiving the description. The Ministry's decision and the description will be available to the public.[34] Appendix A, Table 3 contains the prices. [35]

**France**

*Regulator*
The Autorité de Régulation des Télécommunications (ART) regulates interconnection prices in France.

*Process for Determining Interconnection Prices and Terms*
Operators are to negotiate interconnection and submit the agreement to ART within 10

days after establishment of the agreement. [36] France Telecom must publish a standard price and terms offer for interconnection, subject to approval by ART. [37]

*Points of Interconnection*
France Telecom is required to unbundle its network to a sufficient degree to allow another operator to purchase only those network elements that are strictly linked to the services the operator requests. [38] France Telecom's standard offer must provide for interconnection at all local switches and all switches higher in the switching hierarchy. It must also allow access to all customers connected to a switch without requiring transit via another switch in a higher hierarchy. [39] The standard offer must also include routing services for switched services, complementary and advanced services and functions, procedures for implementing number portability, and descriptions of all physical points of interconnection.[40]

*Settlements Process*
Information was not available.

*Interconnection Prices*
France Telecom is required to establish an accounting system for identifying interconnection costs. This system is to separately identify general network costs, costs specific to interconnection, costs specific to other services, and common costs. General network costs are costs of switching, transmission, and other network elements that are simultaneously used for both interconnection and non-interconnection services. ART is to publish the specifications and details of this accounting system and oversee an independent audit. [41]
Interconnection prices are to reflect interconnection costs. Costs are to be identified based on cost causation, whether direct or indirect. Costs should be forward looking, long run costs based on the best technology available to the industry, assuming an optimally sized and adequately maintained network. Prices should make a proportionate contribution to common costs and provide for normal earnings on invested capital, taking into consideration the weighted average cost of capital. [42] ART is to publish nomenclature for general network costs, costs specific to interconnection, costs specific to non-interconnection services, and common costs. [43]

Appendix A, Table 8 contains prices for France Telecom's standard price offer.

## Germany

*Regulator*
The Regulierungsbehörde für Telekommunikation und Post (Regulatory Authority for Telecommunications and Posts) is the regulator as of January 1, 1998. Formerly, the regulator was the Federal Ministry of Posts and Telecommunications. [44]

*Process for Determining Interconnection Prices and Terms*
Service providers negotiate interconnection. If the providers fail to agree, they may

submit the matter to the regulator for settlement. Service providers must submit to the regulator written copies of interconnection agreements, although operating secrets may be withheld. The regulator publishes notification of receipt of agreements and makes the agreements available for public viewing.

*Points of Interconnection*
Deutsche Telekom is required to provide all solicited unbundled network elements as long as the solicitation is objectively justified. Furthermore, Deutsche Telekom is required to allow interconnection at all transmission, switching, or operational interfaces under the same conditions as it applies to itself. Physical collocation is required if it is objectively justified; otherwise, virtual collocation is required.[45]

*Settlements Process*
Information was not available, but it appears that service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.

*Interconnection Prices*
Interconnection prices are reciprocal, meaning that both parties pay the same price. The former regulator established prices in October 1997 based on an international price comparison. [46] Appendix A, Table 3 contains the German interconnection prices. [47]

**Greece**

*Regulator*
The regulator is the National Telecommunications Commission.

*Process for Determining Interconnection Prices and Terms*
Interconnection prices and processes are not yet established. The regulator will follow the European Union guidelines.

*Points of Interconnection*
Not yet determined.

*Settlements Process*
Not yet determined.

*Interconnection Prices*
Not yet determined.

**Hong Kong, China**

*Regulator*
The Office of Telecommunications Authority (OFTA) regulates interconnection in Hong Kong, China.

*Process for Determining Interconnection Prices and Terms*
Interconnection involving mobile services is handled differently from interconnection for fixed wireline services. OFTA sets or approves interconnection prices for mobile services. These prices are tariffed and reviewed annually. OFTA is requires wireline service providers to negotiate the interconnection contracts, which include the prices. Currently, providers have reached agreement on Type II interconnection covering connections to Hong Kong Telecom's local lines at a customer building. Hong Kong Telecom is the incumbent fixed service provider. Type II interconnection is to also include connections at loop distribution points and distribution frames in Hong Kong Telecom's central offices, but service providers have not entered into agreements on these interconnection points. Providers are still negotiating Type I interconnection – interconnection between network gateways. Interconnection of this type has recently been opened at the incumbent's tandem switches, but OFTA requires that interconnection be allowed at any technically feasible point. Should the negotiations fail, OFTA will determine prices based upon Long Run Average Incremental Costs (LRAIC). [48]

*Points of Interconnection*
Type I interconnection requires companies to establish interconnection gateways for exchanging traffic. Type II interconnection allows connections at customer buildings, loop distribution points, and distribution frames in Hong Kong Telecom's central offices.

*Settlements Process*
For calls between a wireline customer and a mobile customer (regardless of the direction), the mobile customer pays an unregulated usage charge to its mobile service provider. The wireline customer pays no incremental charge for calling the mobile network. The mobile service provider pays Hong Kong Telecom for the call, but Hong Kong Telecom does not pay the mobile service provider. For calls between customers of different mobile service providers, the providers each charge unregulated usage charges to their respective customers. These providers do not pay interconnection charges to each other. Rather, they simply share equally the costs of linking the networks.

*Interconnection Prices*
Interconnection prices for mobile services are tariffed and are based on fully allocated accounting costs. The mobile service provider pays Hong Kong for the calls, but Hong Kong Telecom does not pay the mobile service provider. Appendix A, Table 3 contains the price. Should negotiations fail on Type I interconnection, OFTA will determine prices based on LRIAC.

**Hungary**

*Regulator*
Hungary Communication Authority is the regulator.
Hungary will not allow local exchange competition until November 1, 2002, and will not allow competition for either domestic or international long distance competition until December 22, 2001. Only intermodal competition is allowed in mobile services. There is only one analogue mobile licensee. The two GSM licensees have monopolies in their individual territories until November 4, 2003.

*Process for Determining Interconnection Prices and Terms*
Ministerial Decree determines interconnection prices between public networks. Because of high inflation, regulated prices are allowed to increase at the rate of inflation. [49]

*Points of Interconnection*
Service providers negotiate POIs.

*Settlements Process*
Mobile customers pay a one-time service initiation fee, a monthly fee, and a per call fee.[50] Per call fees apply to calls within a mobile network, between mobile networks, and between a mobile network and the fixed network.

*Interconnection Prices*
Appendix A, Table 9 provides these charges. [51]

**Ireland**

*Regulator*
Office of the Director of Telecommunications Regulation is the regulator.

*Process for Determining Interconnection Prices and Terms*
Information was not provided.

*Points of Interconnection*
Information was not provided.

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.

*Interconnection Prices*
Appendix A, Table 3 provides the prices.[52]

**Italy**

*Regulator*
Communications Authority of Italy is the regulator.

*Process for Determining Interconnection Prices and Terms*
Information was not provided.

*Points of Interconnection*
Information was not provided.

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.

*Interconnection Prices*
Appendix A, Table 3 provides the prices. [53]

**Japan**

*Regulator*
The Ministry of Posts and Telecommunications is the regulator.

*Process for Determining Interconnection Prices and Terms*
NTT (the incumbent) must file interconnection tariffs. [54] Prices are based on fully distributed costs. In some instances, activity based costing is used for maintenance and other expenses. [55]

*Points of Interconnection*
NTT has designated standard points of interconnection. These include leased-line interfaces, tandem switches, signaling network at tandem switches, local switches, access line interfaces, and ends of subscriber lines. [56]

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.[57]

*Interconnection Prices*
Appendix A, Table 3 provides some of NTT's proposed charges as of 1997. [58] Actual tariff prices were unavailable.

**Korea**

*Regulator*
The Korean Ministry of Information and Communication is the regulator.
Process for Determining Interconnection Prices and Terms

Service providers negotiate agreements and may apply to regulator for resolution of disputes. [59]

*Points of Interconnection*
Interconnection is allowed at all technically feasible points. The service provider requesting the interconnection is allowed to designate the switch.

*Settlements Process*
The procedure being adopted is for each operator to bill its own customers and pay interconnection.

*Interconnection Prices*
Currently, prices are to be based on a fully distributed cost method and include a contribution to the incumbent's access deficit.[60] The method being adopted will exclude administrative and research and development costs, depreciation on subscriber lines, and depreciation on mobile equipment. Interconnecting operators are to cover the costs of lines used to establish the interconnection. Appendix A, Table 13 contains the interconnection prices. [61]

**Nepal**

*Regulator*
Ministry of Information and Communication

*Process for Determining Interconnection Prices and Terms*
The regulator directs service providers to initiate negotiations on interconnection agreements. These agreements are to cover the description of the interconnection service, POIs, network planning, charges, settlements processes, billing, operations, and reviews. Charges may be tariffed, kept in contracts, and/or contained in license agreements.

*Points of Interconnection*
Service providers negotiate POIs.

*Settlements Process*
Service providers negotiate the settlements process.

*Interconnection Prices*
In general, prices are based on accounting cost studies that consider both direct costs and a full allocation of costs.

**Netherlands**

*Regulator*
Since August 1, 1997, the Independent Post and Telecommunications Authority (OPTA)

has been the regulator responsible for supervisory and market-orientated executive tasks, including the issuing of licenses, number assignment, supervision of compliance with the regulations and settlement of disputes between parties.

*Process for Determining Interconnection Prices and Terms*
Service providers negotiate prices and terms. If there is a dispute, OPTA will decide the issue based upon European Union Open Network Provisioning guidelines.

*Points of Interconnection*
Service providers negotiate POIs, but the incumbent (KPN) is to unbundle its network and allow interconnection at every technically feasible point.

*Settlements Process*
Information was not provided.

*Interconnection Prices*
Prices are to be based on direct embedded (accounting) costs. Appendix A, Table 3 provides charges. [62]

**New Zealand**

*Regulator*
The Ministry of Commerce is the regulator.

*Process for Determining Interconnection Prices and Terms*
Service providers negotiate all interconnection terms on a commercial basis.

*Points of Interconnection*
Service providers negotiate POIs.

*Settlements Process*
Service providers negotiate the settlements process.

*Interconnection Prices*
The well-publicized negotiations between Telecom New Zealand and Clear resulted in a private settlement between the two companies. Initially, Telecom New Zealand proposed using the Baumol-Willig or Efficient Component Pricing Rule. Clear rejected this proposal and the issue was taken to court. The court found that Telecom New Zealand's proposal was within New Zealand competition law, but sent the issue back for re-negotiation on other grounds. The Ministry instructed the parties to reach agreement, which they subsequently did. Prices have not been disclosed, but they are reported to be something other than Telecom New Zealand's original proposal. [63]

**Pakistan**

*Regulator*
Pakistan Telecommunications Authority (PTA)

*Process for Determining Interconnection Prices and Terms*
Service providers are to determine interconnection terms and prices through negotiation. If they fail, the PTA provides guidelines for, and determines, the terms of interconnection. Guidelines and other policies will be determined on a case-by-case basis.

*Points of Interconnection*
Policies for POIs are not yet determined.

*Settlements Process*
Policies for settlements processes are not yet determined.

*Interconnection Prices*
Pakistan has not yet implemented interconnection policies.

**Peru**

*Regulator*
OSIPTEL

*Process for Determining Interconnection Prices and Terms*
OSIPTEL is responsible for approving interconnection prices. Policies are still in the proposal stage.

*Points of Interconnection*
POIs are yet to be determined.

*Settlements Process*
At this time, OSIPTEL plans for network operators to pay each other for interconnection.

*Interconnection Prices*
Unless an operator demonstrates that a different method is more appropriate, the basis for the prices will be incremental cost with a proportionate contribution to common costs. The incremental costs would be based on the long run and would include costs of assets necessary for interconnection. The contribution to common costs would be equal (on a percentage basis) for each provider. Prices can be based on time of day or volume, and may be based on population density. However, they must be non-discriminatory.

**Portugal**

*Regulator*
Instituto das Comunicacoes de Portugal is the regulator.

*Process for Determining Interconnection Prices and Terms*
Information was not provided.

*Points of Interconnection*
Information was not provided.

*Settlements Process*
Each operator bills its own customers and pays interconnection.

*Interconnection Prices*
Appendix A, Table 3 shows the prices.[64]

**Spain**

*Regulator*
Direccion General de Telecomuniaciones is the regulator.

*Process for Determining Interconnection Prices and Terms*
Information was not provided.

*Points of Interconnection*
Information was not provided.

*Settlements Process*
Each operator bills its own customers and pays interconnection.

*Interconnection Prices*
Appendix A, Table 3 shows the prices.[65]

**Sweden**

*Regulator*
The Ministry of Transport and Communications is the regulator.

*Process for Determining Interconnection Prices and Terms*
Service providers negotiate interconnection prices, but Telia (the incumbent operator) maintains a standard price list. If providers fail to agree on prices, the regulator reviews the offers for fairness, but does not have authority to approve or disapprove. [66]

*Points of Interconnection*
Telia determines a point of interconnection for each serving area.

*Settlements Process*
Each operator bills its own customers and pays interconnection.

*Interconnection Prices*
There are three dimensions to Telia's interconnection pricing – type of interconnection, classification of service, and type of segment. There are three basic types of interconnection services. With "Termination" service, the provider supplying the interconnection service (Provider A) takes a call from another provider (Provider B) and terminates the call to one of A's customers. With "Access" service, Provider A allows Provider B's customer to connect to Provider A's network and use this network to reach Provider B. With "Transiting" service, Provider A carries calls between Provider B's network and another Provider's network. There are also four classifications of interconnection services. These are Basic (for traditional voice grade services), Ancillary (e.g., directory inquiries), International, and Signaling (e.g., signaling information to permit mobile customer roaming in different countries). There are three types of segments. If Telia carries the call between a customer and a POI in the same numbering area, a local segment charge is applied. If Telia carries the call between a customer and a POI within the same interconnect area (as defined by Telia), the interconnection charge is for a single segment. If Telia carries the call into another interconnect area, Telia charges for a double segment. [67] Appendix A, Table 10 shows the prices from Telia's standard list.[68] Prices are calculated using fully distributed costs. [69]

**Switzerland**

*Regulator*
The Federal Communications Commission (ComCom) is the regulator. The Federal Office of Communication (OFCOM) is the advisor.

*Process for Determining Interconnection Prices and Terms*
Service providers negotiate interconnection terms and prices. OFCOM enters the process only if there is no agreement within three months. If it intervenes, OFCOM first conducts an arbitration. If there is still no agreement, ComCom sets the tariffs. Prices are kept in contracts. OFCOM receives copies of the contracts.

*Points of Interconnection*
Service providers negotiate POIs.

*Settlements Process*
Service providers negotiate the settlements process.

*Interconnection Prices*
Prices over the next two years are transitioning from levels based on fully allocated accounting costs to levels reflecting incremental costs. Prices were not provided.

## Uganda

*Regulator*
Ministry of Transport and Communication

*Process for Determining Interconnection Prices and Terms*
Operators negotiate interconnection terms and prices, subject to regulatory approval.

*Points of Interconnection*
Uganda maintains a model interconnection agreement. This model agreement states that interconnection may occur at any technically feasible point.

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.

*Interconnection Prices*
Currently prices reflect a price cap approach, but the regulator is preparing to develop policies for cost orientation.
Each operator covers its own costs of the interconnection. Uganda Telecoms Limited (UTL), the incumbent provider, will receive interconnection payments equal to 40% of its retail local call price for terminating or transiting local calls, 75% of its long distance call price for terminating or transiting long distance calls, and 25% of its long distance call price for originating long distance calls. For calls that originate on UTL's network, UTL will pay other operators 40% of their local call price for terminating or transiting local calls and 75% of their long distance call price for long distance calls for terminating or transiting long distance calls. UTL will also pay other operators 25% of their long distance call prices for originating long distance calls.

## United Kingdom

*Regulator*
Office of Telecommunications (OFTEL)

*Process for Determining Interconnection Prices and Terms*
OFTEL regulates the prices. Initially, OFTEL instructed operators to negotiate. Since then, OFTEL has begun to directly regulate the prices using a network price cap.

*Points of Interconnection*
Service providers negotiate POIs.

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.

*Interconnection Prices*
Interconnection prices in the U.K. have gone from a cost-plus approach to a price cap approach. Initially, prices were based on full allocation of historic costs. Today prices are under a network price cap. OFTEL based the starting prices for the price cap on incremental costs. [70] Appendix A, Table 11 shows British Telecom's (BT's) interim interconnection prices for 1997. The company will be allowed to adjust these prices according to the price cap formula.

**United States**

*Regulator*
Interconnection is basically regulated by the state Public Utility Commissions (PUCs). The Federal Communications Commission's (FCC's) primary influence is through approval or disapproval of Regional Bell Operating Companies' (RBOCs') applications to be allowed to provide long distance services across Local Access and Transport Area (LATA) boundaries. The Modification of Final Judgement (MFJ) that broke up the Bell System in the US in 1984 prohibited the RBOCs from provider interLATA long distance as long as they could use their local networks to harm long distance competition. The US Telecommunications Act of 1996 vacated the MFJ and provided that the FCC is to allow the RBOCs into interLATA long distance as soon as they satisfy a 14-point competitive checklist and show that their entry is in the public interest. Satisfactory interconnection prices and terms are part of the checklist.
Several states have made decisions on interconnection terms and prices, and have published their decisions. This subsection lists the terms dictated by the Telecommunications Act of 1996. It also reviews state PUC pricing decisions by the following PUCs: the Connecticut Department of Public Utility Control, the Maine Public Utilities Commission, the Maryland Public Service Commission, the Montana Public Service Commission, the New Hampshire Public Service Commission, the Washington Utilities and Transportation Commission, and the Wisconsin Public Service Commission.

*Process for Determining Interconnection Prices and Terms*
Operators are to negotiate terms and prices subject to the Telecommunications Act of 1996. If negotiations fail, the regulator conducts an arbitration.

*Points of Interconnection*
Entrants may interconnect at any technically feasible point.

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.

*Interconnection Prices -- Connecticut* [71]
For the first 18 months of interconnection, operators will not charge each other for exchange of traffic. This is called bill and keep. Prices for UNEs are based on TSLRIC plus a contribution to common costs. Appendix A, Table 12 shows the prices.

*Interconnection Prices -- Maine* [72]
Operators will not charge each other for exchange of traffic. Prices for UNEs are based on Total Element Long Run Incremental Cost (TELRIC) plus a contribution to common costs. [73] Appendix A, Table 12 shows the prices.

*Interconnection Prices -- Maryland* [74]
Appendix A, Table 12 shows the prices. The regulator based these on forward-looking incremental costs.

*Interconnection Prices -- Montana* [75]
For any given month, operators will not charge for terminating local traffic unless traffic is more than 5% out of balance for that month. Prices for UNEs are based on forward-looking incremental costs with contributions to common costs. Only the price of unbundled loops is given. Appendix A, Table 12 contains the price.

*Interconnection Prices – New Hampshire* [76]
Prices are based on TELRIC. Appendix A, Table 12 contains the prices. UNE prices for local switching and transport apply to traffic termination.

*Interconnection Prices -- Washington* [77]
Prices are based on forward-looking incremental costs. Appendix A, Table 12 lists prices presented in the regulator's decision.

*Interconnection Prices -- Wisconsin* [78]
Prices are based on TELRIC. Appendix A, Table 12 shows the prices.

**Venezuela**

*Regulator*
Ministry of Transport and Communications

*Process for Determining Interconnection Prices and Terms*
Operators negotiate interconnection terms and prices in Venezuela.

*Points of Interconnection*
Interconnection is allowed at any switch or other network junction.

*Settlements Process*
Service providers pay interconnection to other providers for originating and terminating calls. Customers pay only their own carrier.

*Interconnection Prices*
If the regulator were to intervene in the negotiation process, prices would be oriented on incremental costs with a contribution to common costs from a forward looking cost study.

## Section 4 Conclusion

This study compares interconnection policies from around the world. It has found that OECD countries are generally adopting cost-based or cost-oriented price standards. European Union policies require this for member states. Other countries, such as the US, have legislation that requires cost-based prices. The Baumol-Willig Rule has emerged only in New Zealand, and there it has been replaced with a lower, yet undisclosed, price between Telecom New Zealand and Clear. [79] Uganda has the simplest approach to pricing where interconnection prices are simply a percent of retail prices.

Figures 1 and 2 contrast this study's findings on prices with Ovum's (1997) findings and Salomon Brothers' findings. Each figure shows interconnection prices by country as a ratio of the prices reported for BT. Ratios are shown instead of prices to facilitate comparisons between the studies because each study used different combinations of interconnection services to compute prices.[80] Using a common base (BT's prices) highlights whether the studies found different patterns. BT is used as the base because it is common to all three studies and was the primary focus of the Ovum study.

Figure 1 shows that this study and Ovum found different patterns, especially with respect to the US versus the UK. Figure 1's shaded columns represent Ovum's findings for all of the companies it studied. The white columns show this study's results for companies that Ovum also studied. It is clear from Figure 1 that BT had the lowest prices in Ovum's study, and that US prices were 50% to 175% higher than BT's. In contrast, this study's survey found US prices to be uniformly lower than BT's, ranging from 30% lower to 100% lower. [81] Bell Atlantic's and Ameritech's prices tended to be about one-half of BT's prices, and New England Telephone's prices were much lower because the company has used Bill and Keep. [82] These price differences between the US and the UK are significant because the US has much more aggressive POI requirements than does the UK. With respect to other countries, this study confirmed Ovum's findings.

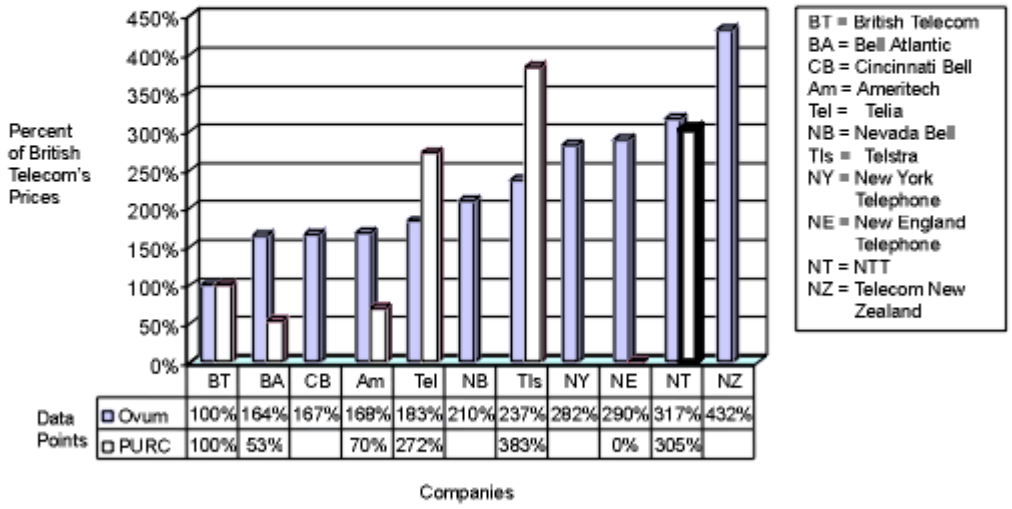
Figure 2 compares this study with the Salomon Brothers study. The shaded columns represent Salomon Brothers' findings, and the white columns represent this study's findings. This figure shows that this study and the Salomon Brothers study found similar patterns. For countries where both Salomon Brothers and this study both had data -- the UK, France, Germany, Denmark, and Sweden -- the price ratios were almost identical.

Looking at both price and non-price issues, this study found that countries are implementing a diverse mix of telecommunications interconnection policies. The US appears to have the most aggressive policies in that incumbents must provide all technically feasible POIs and has the lowest interconnection prices. The UK has prices close to the US prices, but has weaker POI requirements.

Regarding process, most countries require service providers to negotiate at least some aspects of interconnection. Requirements range from requiring negotiation of only operational details (e.g., Canada) to negotiating all aspects (e.g., New Zealand and

Sweden). When negotiations fail, almost all countries have the regulator intervene. Some countries give the regulator only limited authority to settle the disputes (e.g., Sweden) while other countries give the regulator extensive powers (e.g., US), including the power to impose a regulatory system (New Zealand).

Figure 1. PURC and Ovum Findings as a Percent of British Telecom Prices




| Data Points | BT | BA | CB | Am | Tel | NB | Tls | NY | NE | NT | NZ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ovum | 100% | 164% | 167% | 168% | 183% | 210% | 237% | 282% | 290% | 317% | 432% |
| PURC | 100% | 53% | | 70% | 272% | | 383% | | 0% | 305% | |

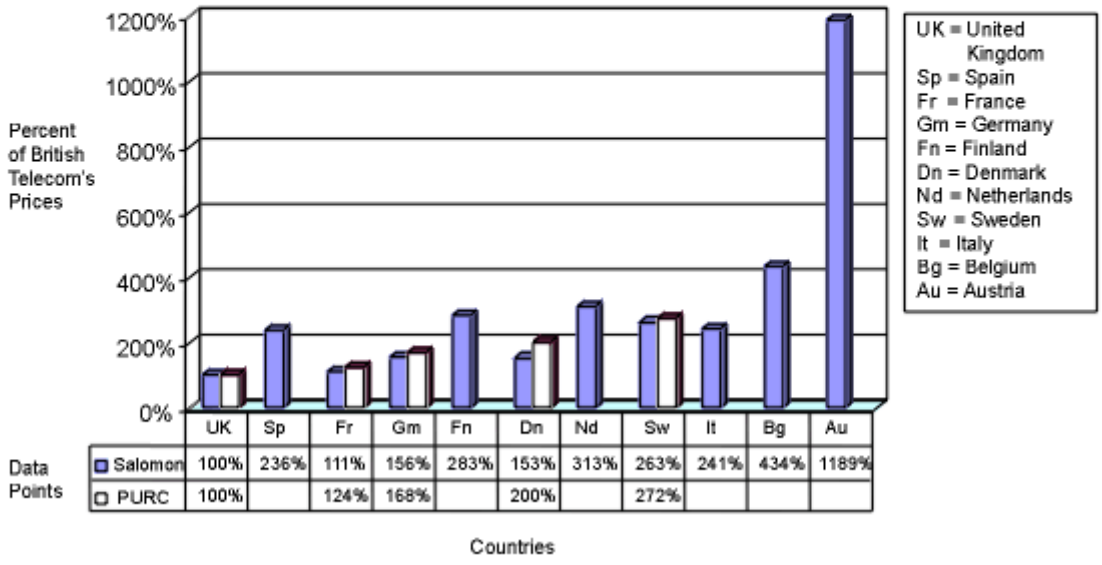
This report is only an initial step and much work remains. Further research should add countries that are missing from this survey and gather additional data on countries that are already included. Additional work should also be done on cross-country price comparisons. Varying price structures and fluctuating exchange rates make casual price comparisons difficult. Price comparisons should be made along several dimensions to avoid having a single price index provide an incomplete picture. Because simply reducing prices to a common currency such as the US dollar misses the economic context of the prices, each country' interconnection prices should be compared to its overall costs of purchasing and providing telecommunications.

Additional research is also needed on why countries adopt the policies they do and what the actual outcomes are. Such research would need to examine prices in the context of what they purchase. Non-price aspects of interconnection should be rigorously analyzed in conjunction with prices, universal service policies, and other entry conditions to

provide a more complete picture of how regulatory policies affect competition and the development of new services.

This project is undertaking an extensive review of US interconnection agreements. Empirical research is planned on how regulatory processes and parties affected the agreements.

Figure 2. PURC and Salomon Brothers Findings as a Percent of British Telecom Prices




| Data Points | UK | Sp | Fr | Gm | Fn | Dn | Nd | Sw | It | Bg | Au |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Salomon | 100% | 236% | 111% | 156% | 283% | 153% | 313% | 263% | 241% | 434% | 1189% |
| PURC | 100% | | 124% | 168% | | 200% | | 272% | | | |

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