

行政院及所屬各機關出國報告  
(出國類別：會議)

參加A P E C 電信暨資訊工作小組  
「電信普及服務義務專家講習會」  
暨「網路互連講習會」  
報告書

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出國地點：印尼 雅加達

出國期間：民國 92 年 3 月 17 日至 92 年 3 月 22 日

報告日期：民國 92 年 6 月 17 日

H6/  
CO9>01674

公務出國報告提要

頁數: 48 合附件: 是

報告名稱:

出席APEC電信暨資訊工作小組「網路互連講習會」及「電信普及服務義務專家講習」

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出國類別: 其他

出國地區: 印尼

出國期間: 民國 92 年 03 月 17 日 - 民國 92 年 03 月 22 日

報告日期: 民國 92 年 06 月 17 日

分類號/目: H6/電信 H6/電信

關鍵詞:

內容摘要: 普及服務的重要性之認定, 係從社會及經濟依賴基礎建設的接取, 即對全體國民基本通信的服務包括基礎電話服務及公用電話服務接取組成之基本建設。社會凝聚力建立於公平觀念支持群體觀感, 普及服務體認應以合理、公平接取電信服務, 無此服務易造成社會落差。網路互連講習會內容重點摘要: (一) 網路互連定義、重要性及WTO與APEC互連原則 (二) 主要互連議題 (三) 監理單位之角色及權力 (四) 固網間之互連 (五) 與行動相關之互連 (六) 網際網路接取的互連 (七) 接續費計算模型 (八) 互連協議書及參考範本

本文電子檔已上傳至出國報告資訊網

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# 壹、APEC 電信暨資訊工作小組「電信普及服務義務專家講習會」

## 一、前言

亞太經合會電信暨資訊工作小組 APECTEL 自 2003 年 3 月 18 日至 3 月 21 日在印尼雅加達舉辦為期四天「電信普及服務」及「網路互連」兩場講習，由澳洲 OVUM 公司負責課程安排，本次參加講習之成員為 APECTEL 經濟體之電信監理者或電信公司，包括印尼、台灣、澳洲、馬來西亞、新加坡、泰國、越南、巴布新幾內亞等國電信監理單位、電信服務業者或顧問公司等約 60 人。

首日「電信普及服務」講習，上課內容除探討普及服務內涵，講述普及服務範圍、普及服務受益對象、普及服務提供者、普及服務分攤者、普及服務成本計算、普及服務基金、普及服務管理架構與機制的精義及各國實例分析外，另透過討論、經驗分享更進一步了解普及服務實施現況，不同國家因國情不同，提供普及服務種類、採行普及服務基金來源方式、管理方式等亦不盡然相同，上課資料詳如本報告附錄。

## 二、講習內容重點摘要

「電信普及服務」為期一天的講習課程內容，涵括：

- 什麼是普及服務？普及服務為什麼重要？
- 有關國際性組織與地域性組織採行普及服務的措施與方法
- 在多數經營者的環境中普及服務的主要議題
- 普及服務成本與普及服務基金



- 管理架構與機制
- 各國實例摘要分析

(一) 什麼是普及服務？普及服務為什麼重要？

普及服務一般係指關於提供基礎電信服務或指定的電信服務予個人或家庭之政策。在已開發經濟體，通常稱普及服務對部分不經濟用戶提供非商業條件之專用電信服務至企業或家庭。典型普及服務有三部份：

■ 在不經濟地區提供電信服務

不經濟地區電信服務，指產生的營收不足以涵蓋提供服務之資金成本與營運成本，對支付之資金無合理報酬。在這地區提供基本語音通信服務，一般是屬於高成本地區，也是偏遠地區或人口密度低的地區。

以一般純粹商業環境中，在此一高成本偏遠地區提供電信服務，係以非常高的費率收取，而普及服務提供者仍被要求以一般單一費率收取，其理論基礎：

- 社會公平性：所有用戶平等對待，就他們所支付等值享有相同電信服務。
- 可負擔性：所有價格須建立在多數人可負擔的基礎上。

■ 在經濟地區對不經濟特定對象之用戶提供電信服務

有許多國家在經濟地區，普及服務提供者被要求對不經濟特定對象之用戶提供普及服務，例如，協助提供低收入戶接取服務或提供殘障人士通信專用設備。諸如美國透過生命線提供普及服務、澳洲提供領取養老金許可人士之通訊服務等隱含對老人及弱勢族群提供服務之社會經濟價值。

■ 公用電話服務

公用電話服務的提供應為普及服務的一部分，最初在已開發的經濟體，當電話密度水準低時，公用電話被強制要求為普及服務；儘管

在已開發的經濟體大量的行動電話服務在過去五十年成長快速甚至遠超過固定用戶數，公用電話的普及服務仍被保留。

普及服務提供的範圍，每一國家的定義不盡然相同，但是有一套共同典型的普及服務設置：

- 基本電話服務：依據 ITU-T 標準技術特性

- 公用電話服務

- 指定的服務，例如：電話號碼簿查詢及緊急服務

有的國家傾向延伸普及服務範圍包括較語音通信服務速率高的數據通信服務或包括寬頻服務。

普及服務的重要性之認定，係從社會及經濟依賴基礎建設的接取，即對全體國民基本通信的服務包括基礎電話服務及公用電話服務接取組成之基本建設。社會凝聚力建立於公平觀念支持群體觀感，普及服務體認應以合理、公平接取電信服務，無此服務易造成社會落差。

為照顧部分民眾，達到非商業性國家目的，普及服務亦體認可能有部分限制市場能力及市場商業操作。

一般而言，電信經營者投資提供服務係期許獲致商業利潤以回報投資人，基因於電信執照擁有及相關規定，須依循國家電信普及服務政策。

## (二) 有關國際性組織與地域性組織採行普及服務的措施與方法

有關全球電信自由化的時程在 1994 年的烏拉圭回合談判時期已成為國際貿易談判的一項重要議題，二項結論：

➤WTO 的形成

➤GATS 首次執行

西元 1997 年 WTO 會員國與會代表達成電信基礎服務協議，參與協議的國家被要求提供時間表，協議條款其中有關普及服務者：任何一會員國有權定義本國提供普及服務的類型；會員國於制定普及服務政策應考量非反競爭、透明化、非歧視及必要性等因素。

地域性組織亦保證電信市場之自由化與競爭的進展，同時提昇會員國人民普及服務及普及通路。例如亞太經合會 APEC 會員經濟體保證建立以上目標。1995 年 5 月亞太經合會在漢城亞太資訊基礎建設宣言採行指導方針，包括：

➤ 提昇競爭環境

➤ 確保民眾電信服務之連結及普及服務

## (三) 在多數經營者的環境中普及服務的主要議題

- 普及服務範圍包含對企業、家庭或社群提供基本及必需電信服務，一般稱電話服務包括公用電話服務。少數國家將寬頻即上網服務納入普及服務政策。
- 普及服務受益者以及其權力的宣稱。
- 普及服務提供者初期一般由獨占時期之既有經營者提供服務，亦有國家拓展至其他經營者亦可提供服務。
- 普及服務成本之決定有兩種方式，透過管理者手段決定或由普及服

務提供者估計後提出主張。

- 普及服務分攤者：普及服務基金的可能來源有普及服務提供者、政府預算、業者的分攤。
- 普及服務的管理：基金的型態、誰是普及服務的管理者、普及服務的管理程序。
- 執行：假設普及服務無法提供或普及服務分攤無法實行時，普及服務政策如何執行？管理者通常透過電信執照的擁有賦予普及服務的提供者提供普及服務的義務；對於普及服務分攤者無法旅行分攤義務時，係處罰以法院強制執行或吊銷執照。

#### （四）普及服務成本

普及服務成本之決定有兩種方式，透過管理者手段決定或由普及服務提供者估計後提出主張。

透過行政程序決定普及服務成本的好處能於普及服務實施前一年度預為估計，但程序上難免不夠透明化，行政上需謹慎評斷。

由普及服務提供者估計後提出普及服務成本有其缺點，即其計算係產生於歷年制成本業已發生之後。

#### （五）普及服務基金

普及服務基金的可能來源有既有經營者、政府預算、業者的分攤等方式，上述方式之採行各有其優缺點。

普及服務基金的分攤方式，又可分為營收、利潤、市場佔有率或其他方式，上述方式之採行各有其優缺點。

## （六）管理架構與機制

普及服務的管理架構與機制涉及許多議題，如普及服務基金的形式之採行有虛擬或實體；普及服務計畫的管理者是部會級、電信監理單位或是業者亦或以普及服務基金特殊管理方式；普及服務管理程序對於普及服務成本及分攤金額的估計、收取、支出如何實行？

## 貳、APEC 電信暨資訊工作小組「網路互連訓練講習會」

### 一、前言

「網路互連訓練講習會」係 APEC 電信暨資訊工作小組「人力資源開發指導分組」計畫之一，其係針對互連經驗有限之電信從業人員所設計之非進階課程，旨在協助 APEC 會員經濟體發展有效之網路互連協定，以促進電信服務市場之發展，課程由澳洲之 Ovum 負責。由於 2002 年 7 月於曼谷舉行的第一次訓練講習會反應良好，故本次應印尼政府要求在雅加達辦理第二次訓練，兩次課程內容大致相同。

本次參加講習之成員包括印尼、台灣、澳洲、馬來西亞、新加坡、泰國、越南、巴布新幾內亞等國電信監理單位、電信服務業者或顧問公司等約 60 人。講習內容包括互連之基礎、互連服務及協議、協商仲裁及執行等，上課資料除本報告附錄所列外，有興趣者亦可至 Ovum 網站<http://interconnect.ovum.com/index.htm>處下載。

### 二、會議議程

#### ◎第一天(2003.3.19)

- 網路互連定義及其重要性
- WTO 電信基本服務協議及 APEC 原則
- 主要互連議題
- 各種網路互連型態
- 監理單位之權力及資源

#### ◎第二天(2003.3.20)

- 成本計算模型

- 計價結構及大小
- 互連協議書及參考範本
- 互連協商之演練

◎ 第三天(2003.3.21)

- 互連協商之演練及檢討
- 爭議處理方式
- 執法機制
- 綜合討論

### 三、講習會內容重點摘要

#### (一) 網路互連定義、重要性及 WTO 與 APEC 互連原則

網路互連係允許連接至某一網路之用戶終端可：

- 呼叫任一其它網路之用戶終端或被被呼叫
- 接取其他網路之服務
- 選擇提供服務之業者

如果沒有網路互連將無法促成多業者自由競爭之環境，因為如果消費者無法確保在新業者網路上仍能同樣地被其它用戶呼叫或呼叫其它用戶，消費者將選擇擁有最多用戶之業者，即是既有業者，故競爭無法形成。

因此監理法規需確保任一網路間之互連性及既有業者須在其他業者要求下提供互連。

1997年2月簽訂之WTO電信基本服務協議為各會員國最高指導原則，其中有關互連部分規定如下：

1. 本規定適用於提供公眾電信傳輸網路或服務之業者間的互連，旨在使甲業者的使用者可與乙業者之使用者通訊，若已提出承諾，且可接取乙業者提供之其他服務。
2. 確保網路之互連：保障在網路內任何技術上的適當點，得以與主要業者之網路互連，此等互連提供應：
  - (a) 無歧視性條款、條件（含技術標準及規範）及費率下提供，且品質不低於提供給其自營的類似業務，或提供給非關係企業業者或其子公司或其關係企業業者之類似業務；
  - (b) 及時，且各項條款、條件（含技術標準及規範）及成本導向之費率等，皆須透明化、合理化，並考慮經濟可行性，將網路功能充分細分，俾介接業者可不必支付不須使用之網路設備費用；且



(c)除提供大部分使用者介接之網路終端點外，亦應依業者要求於網路內任何一點為其介接，其收費應反映必要之額外設備建構成本。

3. 網路互連協商程序之公開化：與主要業者網路互連之協商程序應可公開取得。
4. 網路互連安排之透明化：確保主要業者將其網路互連協議或參考用之網路互連提議可公開地取得。
5. 網路互連之爭議處理：與主要業者互連之業者得於 (a)任何時間或 (b)已公告週知之一合理期間後向獨立之國內機構（其可能是下述第 5 段所列之監理機構）求助，俾在合理時間內解決先前未定案之有關網路互連之條款、條件及費率之爭議。

此外，依據 WTO 基本電信協議之精神，APEC 內之 WTO 會員國與有意加入 WTO 之經濟體共同提出 APEC 網路互連原則之聲明，在第四次 APEC 電信暨資訊產業部長會議中，已有十個經濟體提供其執行這些原則的時間表，分別為：澳大利亞、加拿大、香港、中國大陸、印尼、日本、紐西蘭、菲律賓、新加坡、中華台北與美國。其原則為：

1. 主要業者有義務於網路內任何技術可行點提供互連。
2. 主要業者有義務在無差別待遇及互連條件（包括技術標準及規範）透明化之前題下提供互連。
3. 主要業者有義務以無差別之費率提供互連，以及品質不得低於自營的類似業務，亦不得低於提供給其他非關聯業者或其子公司。
4. 主要業者有義務適時提供互連及良好的協商原則。若主要業者延遲履行其義務，監理單位有解決爭端之機制，包括運用一般或特定領域之特殊競爭法及相關罰則。
5. 主要業者有義務依成本導向之費率提供網路互連。

- 5.1. 監理單位應有程序以增進成本導向費率之透明性。
- 5.2. 透過向有興趣的業者廣泛諮詢成本方法論或其他機制，以獲得合理的及經濟可行的成本導向費率。
- 5.3. 主要業者有義務以充分細分化的方式提供互連，使業者不必就不須使用之網路元件或設備支付費用。
  - 5.3.1 為使業務競爭者具有進入每一市場的基本能力，應要求確認主要業者網路中重要的、技術的及經濟可行的網路接續點。
  - 5.3.2 為使能在合理條件下接取細分化元件，通常監理單位要求主要業者提供接取至主要路權，例如電桿、管道與線管。
- 5.4 主要業者有義務依要求提供互連，當網路終端點設在其它互連提供者提供的主要介接點以外時，根據必須增加相關設備所需之可證明成本收費。
6. 主要業者應避免反競爭行為，例如違反公平競爭之交叉補貼及獲自其他業者之反競爭補貼。
  - 6.1. 主要業者應避免反競爭行為，例如將取自競爭者之資料誤用。
  - 6.2. 主要業者應避免反競爭行為，例如不將重要設備的最新技術資訊及商業相關資訊提供給其它業者，而這些資訊對其它業者在提供服務時是必需的。
7. 主要業者與其它業者間之網路互連協議書或主要業者之網路互連條款參考範本應可公開地取得。
  - 7.1. 與主要業者網路互連之協商程序應可公開取得。
8. 與主要業者互連之業者得於(a)任何時間或(b)公開規定之時間後，向監理單位提出申訴，俾在合理時間內解決網路互連有關之條款及費率之爭議。
  - 8.1. 監理單位事先明確陳述爭訟處理機制，以協商雙方產生強烈誘因在良好原則下協商。

8.2. 監理單位有權對於無法在合時的方式及良好原則下達成協商之雙方給予處罰。

## (二) 主要互連議題

在擬定互連政策時，有下列幾項重要議題應先予以釐清：

- 哪些業者有義務提供互連受話服務？
- 哪些業者有義務提供互連發話服務（平等接取）？
- 應管制哪些費用？

Ovum 認為所有的互連受話服務均應受到管制。另外，具市場力量業者所提供之互連發話服務亦應受到管制。許多國家正在探討非市場主導者之接續費是否亦應受管制之議題。然考量無市場力量的小業者將被迫提供互惠的條件給與之互連的較大業者，因此歐洲有越來越多國家（包括歐盟執委會）主張無需管制非市場主導者之接續費。

在發信端付費(Calling party pays; CPP)的行動電話市場，由於一般消費者係依據發話所需付擔之費用來選擇行動電話業者，較不在意受話時對方所需負擔之費用，因此對於固網撥打行動電話之通信，即使是不具任何市場力量之小行動電話業者仍能訂定高於成本的接續費。Ovum 估計行動電話受話之成本約為固網受話成本的 6~10 倍。例如，若行動電話之技術成本較固網貴三倍，而行動電話未達經濟規模會使成本加倍，因此造成行動電話之接續費為固網接續費的六倍。且若資金成本或其他無效率所造成之成本增加因子為 50%，則最後將造成行動電話之接續費為固網接續費的九倍。

然而大多數歐洲監理單位僅將注意力放在固網的受話接取上，並使固網受話接續費朝向成本計價，並未管制行動電話受話接續費，因

此使得行動電話之接續費超過固網接續費 6 倍以上，甚至法國、德國、荷蘭及西班牙等國還超過 25 倍。此顯示零售市場的獨佔或具顯著市場力量並非有效控制特定瓶頸服務（例如提供接取其用戶之受話服務）的必要因素。亦即，若不加以管制，即使小業者在訂定受話端接續費上仍具有相當大的市場力量。

- 為使既有業者網路得以提供互連服務，哪些業者應付費及負責網路升級？

只有與機房準備互連所需之一次成本（例如共置）由要求互連之業者負擔。意即後續要求在同一機房互連之業者只需負擔較少之新增成本。另外，修改系統（例如帳務系統、維運系統）之額外成本可由要求互連之業者回收，或視為聯合成本或共同成本，而由每分鐘之接續費回收。若系統修改係因業者不同而有特殊之差異，則其成本由要求互連之業者負擔。

- 賦予哪些業者有獲得互連服務之權利？

互連係批發服務，並不等同於零售服務。因此限制只有提供批發服務或零售服務之電信業者有資格獲得互連服務。然是否限制僅具基礎設施(infrastructure base)之電信業者有要求互連之權利，或規定任何執照之電信業者（包括服務提供者）均有要求互連之權利，則屬政策議題。也就是說，提供 VoIP 的 ISP 業者是否可以要求與既有業者互連，或此 ISP 僅能視為具基礎設施業者之用戶，而所謂互連服務僅能發生在具基礎設施業者間。

- 哪些事項由業者商業協商訂之？

互連結果由監理單位決定或由業者依商業協商決定各有其優劣點。然在自由化初期，既有業者在互連協商方面仍具有相當大的力量。為避免既有業者藉延宕互連協商、訂定不利於新進業者之互連協議...等手段，來拖延網路服務競爭之引入，監理單位有必要介入。然

而不幸的是，監理單位在此初期階段對於網路互連相關事項的經驗及技能卻是最弱的。但仍建議監理單位至少應儘早決定下列事項：

- 受話之接續費(call termination rate)及互連階層（double transit、transit 及市話）
- 實施平等接取
- 於平等接取時之發話接續費(call origination rate)及互連階層（double transit、transit 及市話）
- 建立網路互連及提供額外話務容量所允許的最長時程。
- 國際來話之話務分配
- 處理互連話務之無歧視原則
- 哪些設備應共用，例如天線、管道、電桿。
- 其他屬於 WTO 協議所稱「技術可行」之網路介接點。
- 公佈互連相關之 QoS 統計。
- 擬定號碼指配政策
- 實施號碼可攜
- 實施細分化市內用戶迴路
- 網路階層架構上允許作為互連介接點的層級

### （三）監理單位之角色及權力

在市場開放初期，與既有業者網路互連係新進業者存活的關鍵，因為若無網路互連，新進業者將無由接取既有業者廣大用戶。然既有業者基於本身商業利益的考量，會儘量拒絕或拖延網路互連。可知若缺乏相關規定或無強制執行法規的公權力，網路互連將無法實現。因此，確保法規上所規範的互連安排能有效被實現係監理單位的主要角色之一。此外，政策之擬定與監督管理應予分離。由政策決定單位擬定

整體政策，但不訂定詳細規範；而由監理單位訂定詳細規範並據以執行，以實踐政策。

為實現網路互連，監理單位應具備下列權力：

- 決定接續費計算基礎的權力
- 決定互連協議之營運及技術之權力，包括時程表。
- 要求互連雙方提交仲裁的權力
- 解決爭議的權力
- 對互連雙方發布指令的權力
- 強制執行互連判決

監理單位大部份的目標是阻止某些不良的行為，然互連卻是促使無意願之一方遵循監理單位之要求。因此競爭初期，監理單位在網路互連上係扮演重要角色。許多政府喜歡將互連回歸由業者自行商業協商，只有在無法達成協商時才允許監理單位介入。在缺乏更進一步的競爭防護措施下，此一做法是不切實際的。下列與互連相關之議題亦須適當處理，否則會對互連產生不利影響：

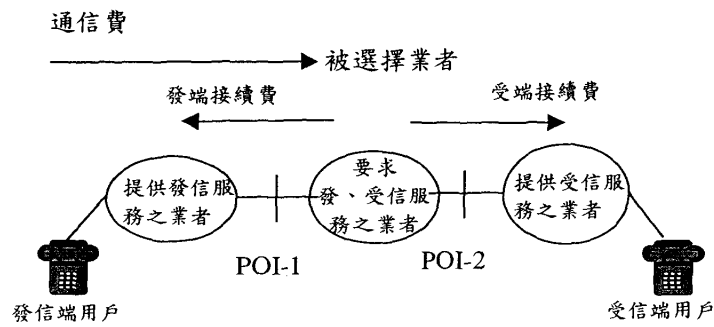
- 號碼之核配：新進業者可能需要用戶號碼區塊、業者選擇碼(carrier selection codes)、號碼可攜碼(number portability codes)、訊號點碼(signaling point codes)，而這些碼的核配可能為既有業者所掌握。因此監理單位應取得這些碼的核配權，或至少應訂定透明化的核配原則，使既有業者核配碼時能符合無差別待遇之原則。
- 號碼可攜：若新進業者欲提供直接服務給他的用戶，在開放競爭的最初 2~3 年需要實施號碼可攜服務。一般而言，非地理號碼(non-geographic number)之可攜服務的經濟利益最大，行動號碼則最小。所有的經驗顯示，需監理單位的大量介入方能有效實施號碼可攜。

►設備共用：管道、電桿及無線電塔台等設備之共用能節省及降低非直接之經濟及環境成本。但若無監理之壓力及監理單位介入決定其費率，則既有業者不可能同意設備共用。

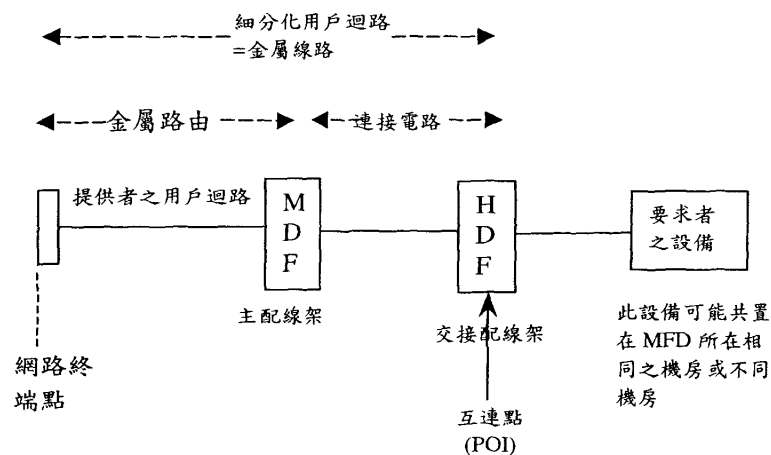
#### (四) 固網間之互連

固網間互連包括五大類，茲分述如後：

- 受信服務 (Call termination)：受信服務包括將此話務傳遞至自己的用戶或轉接至其他網路。其中轉接至其他網路包括國際通信、轉接至國內其他行動電話或新進業者的網路。市話新進業者均傾向於與既有業者互連，並靠既有業者將其話務轉接給其他業者。由於既有業者除了要確保將其用戶之發話傳遞至另一網路之受話端，同時亦須確保其用戶能收到另一網路之發話，因此受信服務係互惠的。此時，營收歸屬發信端業者，並由發信端業者支付提供受信服務之受信端業者接續費。一般而言，既有業者與新進業者間的來去話務是平衡的。然若是新進業者經營大量的電話投票服務、預約訂票服務、維護及緊急呼叫服務、或是與 ISP 相結合，將造成既有業者至新進業者單向之話務激增而影響話務平衡。
- 發信服務 (Call origination)：發信服務亦稱業者選擇服務(carrier selection service)。也就是透過平等接取，既有業者之市話用戶能以 Call by call 或 pre-selection 的方式選擇新進業者所提供之長途轉接服務或國際電話服務。此時營收歸屬被選擇之業者，由被選擇之業者付發信端網路業者發端接續費、付受端網路業者受端接續費。發信服務之安排並非互惠的。因為既有業者可能因為本身的費率較高，無法吸引到這類用戶，因此不想提供發信服務給新進業者。



- 市內用戶迴路細分化：市內用戶迴路細分化亦可歸類於互連服務的一種。由新進業者向既有業者租用市內用戶迴路以直接連接用戶至交換機。除非號碼可攜服務已實施，否則用戶轉移至新進業者必須改變其電話號碼。



- 支援服務：下列額外服務需被成功運作，由於這些服務亦能由新進業者提供，因此監理單位允許既有業者於訂定這些服務之價格時加上利潤。

- 值機員受話服務
- 接取緊急服務中心
- 接取查號服務



►為排除故障而與維運人員之互連

- 專線：雖然有些監理單位並不要求既有業者提供部份專線，然專線亦可能被互連。大部分的情況是因為新進業者網路建設的關係，無法提供用戶全段之專線。因此新進業者會儘可能建設至目的端，剩餘部分再與既有業者之專線互連，而付給既有業者該部分之專線費用。

其他相關固網互連之議題分述如下：

- 網路介接點：

一般而言，有三種互連程度，其在所需之介接點個數、互連服務提供業者須承載此話務之距離、應支付之接續費高低，各有不同的取捨。三種互連程度如下表：

程度 (以地理涵蓋區分)	程度 (以網路階層區分)	介接點個數 (一般而言)	接續費
整個國家級	Double transit	1~2	最高
區域級	Single transit	5~50	中等
城鎮級	Local	>50	最低

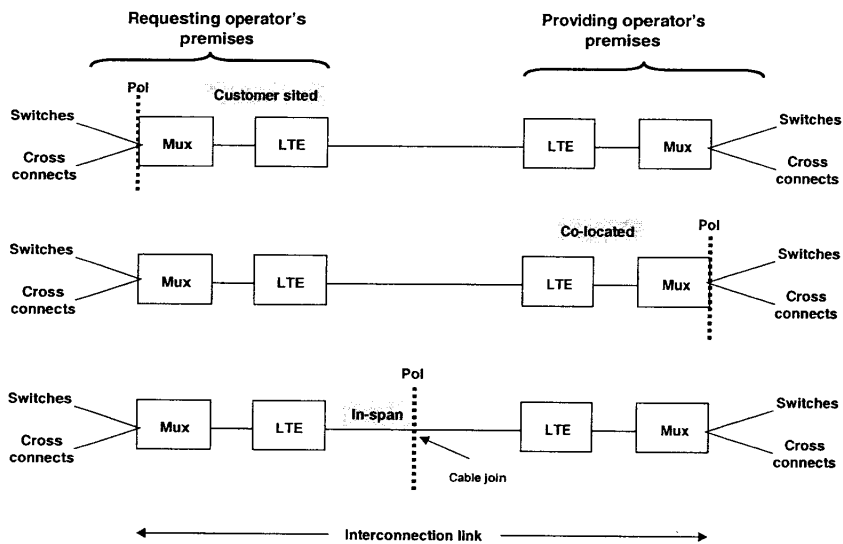
雖然每一種互連程度都能提供發信及受信服務，但國際通信業者只對整個國家級的互連有興趣。此外，監理單位可能會採取限制既有業者提供發信服務距離的方式，提供新進業者建設本身網路基礎建設之誘因。

從監理單位對不同互連程度的要求可以反映出係鼓勵以服務為基礎之競爭亦或鼓勵以基礎設施為基礎之競爭。當鼓勵以服務為基礎之競爭時，會使新進業者僅可能租用既有業者之基礎設施；而當鼓勵以基礎設施為基礎之競爭時，會給予新進業者自建其網路之誘因。在實際網路互連安排時，網路介接點之位置分為下列三種，如下圖

:

- 用戶端互連(customer sited interconnection)：提供互連業者（Providing operator）於互連要求業者（Requesting operator）的土地提供電纜或無線鏈路，並連接這些電纜至本身的傳輸設備。
- 共置(co-location)：要求互連業者提供電纜或無線鏈路及其傳輸設備於互連服務提供業者的土地。
- 一定距離之互連(in-span interconnection)：於要求互連業者與提供互連業者的土地間作相容之電纜銜接，或每一業者使用其相容之無線設備。

互連鏈路（Interconnection link）為業者最接近 POI 之傳輸設備間之傳輸路徑，其電纜及線路終端設備（LTE, Line terminating equipment）決定此互連鏈路之最大容量。



互連電路（Interconnection circuit）是透過 POI 之兩互連交換機間之傳輸路徑，且僅用於支援交換服務之互連，其通常以 E1 或 T1 電路數來計算，總 E1 互連電路數可低於互連鏈路之容量，共用相同互連鏈路之互連電路可連接不同組交換機。

POI 亦可被用於專線互連，惟在此情況下，專線是在傳輸層次互連而非在交換機上互連。

●話務量：

由於既有業者的用戶與新進業者的用戶均有彼此通信的需求，因此就點對點的通信而言，既有業者與新進業者間之來去話務量可能相同，且會蓋略地隨新進業者網路佈建比率的增加而增加。然而，若新進業者成功獲取較高比率的受話型業務成為它的用戶，則會造成來去話務的不平衡。例如：

➤流入型呼叫中心(In-bound call centers)：新進業者經營處理大量市場廣告競賽、電話民意投票、訂票服務、維護及緊急呼叫服務等業務，將會增加撥至新進業者的話務量。

➤撥接至 ISP 的話務意味著大量的單向話務。

平等接取的話務量則又有所不同。強烈的市場競爭將能迅速獲取高的話務量，而通常此話務是從既有業者流向新進業者。

●非地理性服務的互連：

非地理性服務，主要包括兩類：

➤如免費電話、額外付費電話（Premium rate）之特別收費服務，其可能包括撥接上網電話服務。

➤提供給用戶不應變更地點而須改變電話號碼之服務。

此類服務對新業者很有吸引力，因為如果能擁有具有大量話務量之客戶，將可以得到很大的營收，惟其利潤將視互連費之高低而定。其互連之商業安排將視付費流程方向及監理者採取之方法而定，例如：

➤對於免費電話服務，由於是由受話用戶付費給新業者，再從新業者付費給既有業者，此互連服務為發話服務。

➤對於長途費率及額外付費電話服務，由於是由發話用戶付費給既有

業者，再從既有業者付費給新業者，新業者再分配此收入至受話用戶，對於額外付費電話而言，其分配比例相當高。

➤對於市話費率服務，發話用戶及受話用戶可能皆須付費，且可能有些互連費之支付。

主要商業及監理安排視既有業者之角色而定，如果既有業者被視為提供發話服務，則監理者僅允許既有業者攤平成本而收到很低之互連費，其通常適用於免費電話服務。

對於既有業者用戶須付費之服務，費用之支付將依據既有業者被視為提供發話服務給新業者或新業者提供受話服務給既有業者來決定，前者既有業者只保留提供發話服務之互連費，而後者既有業者保留發話用戶所付費用而付新進業者提供受話服務之費用。

將其分類為發話服務或受話服務可依據此電話是發話用戶必要打的或受話用戶吸引而來決定。英國的 OFTEL 最起初視這些電話為發話服務但允許 BT 作零售提高 (Retail uplift) 來補償額外成本，此決定使得新業者儘可能連接至受話端，甚至使得新業者分享部份營收給 ISP，因而促成了免費 ISP 服務之產生。但是後來 OFTEL 因業者要求而檢討此決定，後來，OFTEL 認為號碼轉換服務為零售與網路活動之混合，因為號碼轉換服務為地區性電話及非直接接取服務之混合，OFTEL 保留其原來之決定，但允許零售提高可包含更多成本，故 BT 可收取更多費用，其零售提高之項目包含：

➤財務及收帳成本

➤客戶服務

➤行銷—為使更多客戶連接至 BT

➤行銷—針對非英國之客戶

➤行銷—為增加電話營收

➤帳單查詢

➤故障報告

➤抱怨

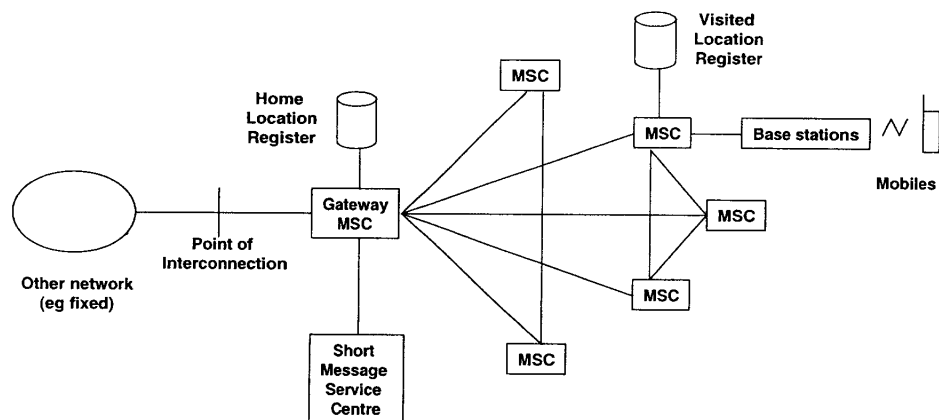
➤非直接零售成本

此方法造成免費電話號碼與其他電話號碼有不同之零售提高，前者為 0.1257ppm (pence per minute)，而後者為 0.2191ppm。

澳洲則採取相反的作法，其視此類服務為新業者提供既有業者受話服務。

#### (五) 與行動相關之互連

行動網路之互連架構如下圖所示，行動網路是透過閘道 MSC (Gateway MSC) 與其他網路互連，閘道 MSC 亦連接到 HLR 及短訊服務中心 (SMSC, Short Message Service Center)。



●行動至固網之互連：行動至固網之互連安排原則上與固網與固網間之互連安排類似，許多行動業者只與既有固網業者網路互連，而透過既有固網業者網路轉接話務至新固網業者。

●固網至行動之互連：

固網至行動之互連在技術上與行動至固網之互連相似，但從商業或監理之觀點而言，其有極大的不同。因為去話零售價格之高競爭壓

力及監理者未監理來話之受話互連費，許多國家的行動業者對來話收相當高的受話互連費，但對去話收相當低的零售費，而造成交叉補貼的現象。因監理者認為來話之受話互連費已有非直接之競爭壓力，故在行動業者市佔率很低時尚無須監理受話互連費。

但 Ovum 有不同之看法，因為大部分之客戶是基於去話之費率而成為某一行動業者之用戶，因此對來話之受話互連費此業者有微獨佔（Micro-monopoly）情形，因而受話互連費應以成本計價。

- 行動與行動之互連：如果話務量夠的話，行動網路可直接互連至其他行動網路，然而大部分行動業者是透過既有固網業者轉接至其他行動網路，有些既有固網業者亦提供具吸引力之互連費率來保有話務量。行動網路需要針對支援漫遊的其他行動網路作訊令的互連，其通常以專線或類似容量來達成。

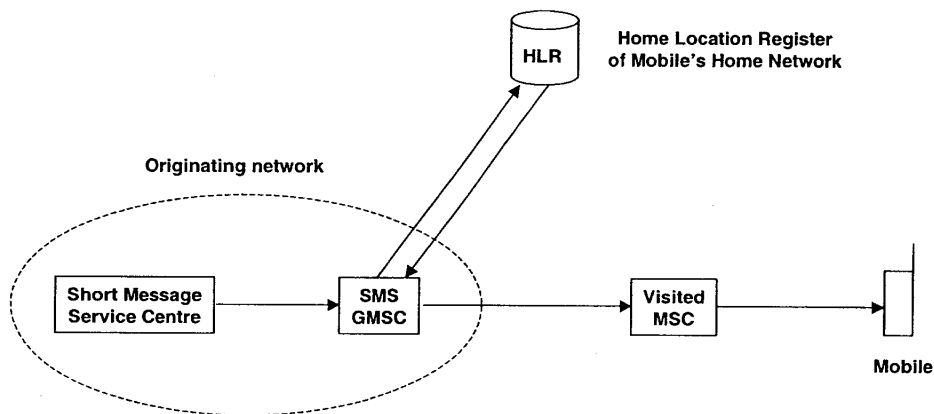
- 短訊服務中心之互連：

短訊服務提供在行動終端間、服務中心或網頁到行動終端之最多 160 個字元之訊息傳送服務，此訊息被視為訊令之一部分，接收者以其行動電話號碼來識別，所有短訊皆先被送至短訊服務中心後再送至行動接收端。如果訊息是從行動用戶發出，由發話者之行動網路之短訊服務中心處理，如果訊息是從服務中心或網頁發出，則由與服務中心或網頁提供者互連之行動網路之短訊服務中心處理，惟服務中心或網頁提供者並非電信業者，其與行動業者間之互連及其費用已逐漸產生監理問題，監理者須注意其發展。

短訊服務中心傳送訊息至 SMS 之閘道 MSC，此閘道 MSC 詢問被呼叫行動用戶之行動業者之 HLR 來找出呼叫行動用戶之所在地點，然後將訊息送至被呼叫行動用戶，如果被呼叫行動用戶暫時找不到，此訊息將被存在發話網路之短訊服務中心，被呼叫行動用戶之行動業者之 HLR 保留此短訊服務中心未成功送出之記錄，待此用戶出現

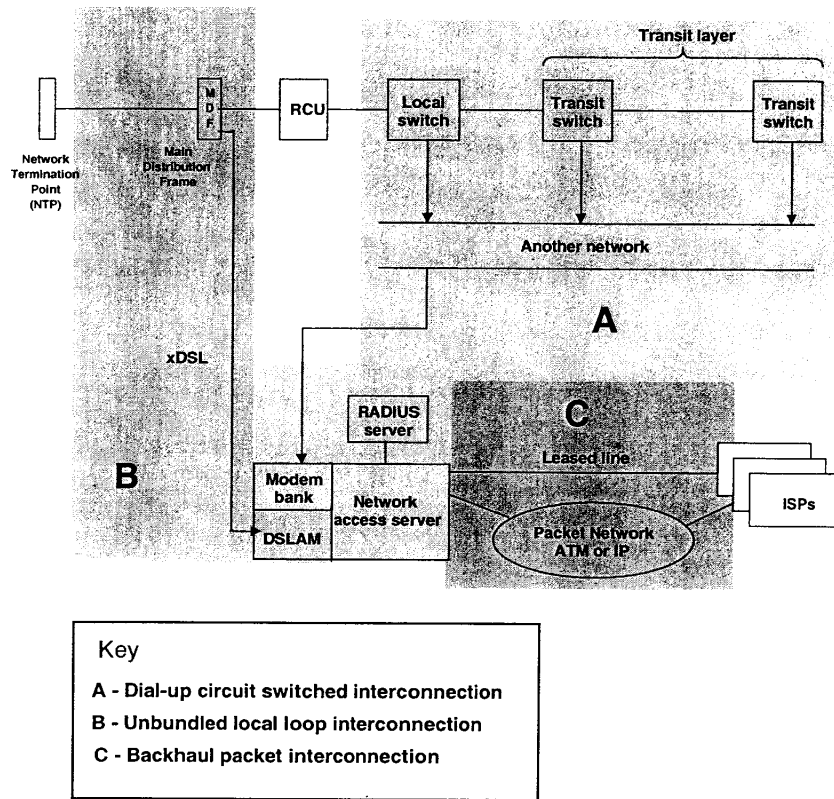
時再通知此短訊服務中心從送此訊息。

SMS GMSC 與 HLR 間之訊令互連與漫遊之訊令互連相同，而短訊服務中心與服務中心或網頁提供者之互連可以專線或其他數據通信方式達成。



#### (六) 網際網路接取的互連

固網與 ISP 的互連接取依接取技術可區分為：固網透過撥接方式上網（如下圖之 A 型）、透過細分化市內用戶迴路接取網際網路（如下圖之 B 型）、及 Backhaul 分封式網路互連（如下圖之 C 型）三大類。



監理單位對此三大類互連之觀點如下：

●固網透過撥接方式上網

將撥接上網納入管制在許多國家可能原因如下：

- 1.既有業者控制瓶頸的主叫端市內用戶迴路，然其他業者需要接取此（發信端）用戶迴路，以能夠將話務承載至ISP。
- 2.許多既有業者同時亦是提供ISP服務之主要業者，有可能採取差別待遇，提供較優惠的接取費率給自己的ISP，而不對等地提供給其他ISP，或對於想承載話務至ISP的其他業者訂定不相同的互連費率。
- 3.政府想促進網路網路接取蓬勃發展，因此要求既有業者提供較低的零售價格，造成新進業者難以進入市場。



對發信納入管制的範圍不僅包括主叫至市話交換機之接續費，亦包括既有業者有義務承載話務之最遠距離、決定競爭業者最少應建立之互連點個數。在某些國家，既有業者只需提供在市話交換局或區域等級的互連（要求 ISP 或他們的業者有許多互連點），而無須提供只需一兩個互連點的全國等級互連。

監理單位將網際網路接取之批發發信視為缺乏有效競爭的瓶頸服務。因此要求既有業者（或擁有市話接取網路之業者）於提供發信服務給其他業者時，應依成本為基礎計價，且不得為差別待遇。

於 2000 年 5 月，英國的 Oftel 是第一個要求既有業者(BT)對市話交換機所提供之網際網路接取發信服務，其接續費採包月制(flat rate internet access call origination; Friaco)的監理單位。非網際網路接取之話務其接續費仍按分鐘數計費。然由於其他固網無法建設其網路與既有業者的所有市話交換機連接。因此對於透過彙接局轉接之上網話務其接續費仍按分鐘計。Oftel 於 2001 年 2 月將對 BT 上網話務接續費採包月制之要求擴大至彙接局，但考量不對 BT 彙接局造成過大的負荷，在 2003 年 1 月前，對各固網業者允許連接至每一 BT 交換機的 port 數有設限。

某些歐洲國家的監理單位亦要求既有業者提供包月制網際網路接取服務，例如法國、義大利葡萄牙及西班牙要求於市話及彙接交換機提供包月制網際網路接取服務；德國則只要求於市話交換機提供包月制網際網路接取服務；荷蘭則只要求於彙接交換機提供包月制網際網路接取服務。

接續費與零售價格彼此在某種程度上匹配是很重要的，否則會給予新進業者利用不匹配情況賺取既有業者錢的機會。

例如許多監理單位規定接續費按話務量以分鐘或以秒計費。然而某

些零售價格（特別是市話）卻有不同的費率架構，例如：美國許多市話通信是免費或包含於月租費中，某些國家的市話則按通計費。當零售價格是這種費率架構時，若接續費按通信時間之長短計費，則一通新進業者受話之通信時間越長，越會發生既有業者所收取之通信費不足以支付接續費之情況。此一情況會給予新進業者與既有業者有大量用戶的市話地區建立互連點的誘因，並與 ISP 相連接以獲取大量 holding time 長的話務。

在澳洲及紐西蘭的新進業者採取此種方式。澳洲的市話係按通計費，紐西蘭住宅用戶的市話通信費係包含於市話月租費中。既有業者市話通信只有固定的通信費營收或完全無營收，而接續費按通信時間計費，而撥接上網的通信時間比一般語音通信時間長，造成既有業者金錢上的損失。為解決此一爭議，監理單位對於撥接上網話務訂定接續費之支付上限。例如澳洲監理單位 ACCC 於 2002 年 3 月訂出新的接續費率如下：

- 1.call set-up 每通 0.03 cent
- 2.接續費每分鐘 0.13 cent
- 3.通信時間超過 40 分鐘以上的部份，接續費為零。

因此，相較於不限時間的市話通信費 18~22cents(按是否屬同一市話交換局有不同之費率)，每通長時間通信既有業者最多只需支付 5.23cents 的接續費。而作成此一決定時，ACCC 有考慮到 2000~2001 年依成本計算之語音通信接續費為每分鐘 1.52cents，無上限之限制，且其中包每分鐘 0.69cents 的市話虧損分攤。

●透過細分化市內用戶迴路接取網際網路

此係透過 DSL 技術接取網際網路。ADSL 接取服務所需之 modem 及

網路接取伺服器(network access server; NAS)由競爭業者或 ISP 業者提供。此實際用戶迴路細分化(physical local loop unbundling)之方式又可分為完全細分化(Full unbundling)及線路分享(loop sharing)兩大類。

監理單位介入 ADSL 及細分化用戶迴路之提供的原因：

- 1.由於擔心提供 ADSL 寬頻接取服務將造成原撥接上網營收的損失、無法確實解決串音問題及對投資的怠惰，既有業者通常不願儘快提供 ADSL 寬頻接取服務。此一情況導致需實施細分化用戶迴路，以使其他業者及 ISP 有機會在寬頻接取方面提供創新的服務。
- 2.許多既有業者亦是主要的 ISP 服務提供者，因此在提供 DSL 接取服務給 ISP 時可能會發生差別待遇。此一擔心導致要求將接取的提供從既有業者的營運中要分離出來，就如同 ISP 一樣，以確保既有業者能無差別地對待 ISP。

對細分化實施管制可能要求下列兩種或其中之一：

- 1.完全細分化(Full unbundling)：競爭業者向既有業者租整段市內用戶迴路，並取得該終端用戶。
- 2.線路分享(loop sharing)：競爭業者僅取得部份市內用戶迴路，通常是 ADSL 部份，而仍由既有業者提供電話服務給終端用戶。

監理單位通常會要求前述兩項服務之價格應按長期增支成本計算(long-run incremental cost; LRIC)。

另一要求監理單位介入的重要議題是共置空間的提供。對監理單位而言這是個困難的區域。難以同時滿足競爭業者的商業利益與既有業者的產權。既有業者通常會在意安全問題，及為本身商業行為和

未來需求而主張在交換機周圍保留空間的權利。同樣地，新進業者要求於既有業者 MDF 附近放置設備。有關實際情況與共置價格兩方面的爭論，並無簡單的答案，但可以肯定的是，若無監理單位的介入，設備共置將難以達成。

細分化市內用戶迴路的成就依據監理單位介入的程度，在不同的國家有很大的不同。於 2001 年，美國出租之細分化市內用戶迴路有 4.4 百萬條（佔全部市話線的 2.3%）、德國有 204,000 條（佔全部市話線的 0.4%）、澳洲有 80,000 條（佔全部市話線的 0.8%），以上這些國家的監理單位已在價格的訂定及確保新進業者能共置 DSL 設備方面採取行動。另一方面，法國及英國出租之細分化市內用戶迴路較少，因為這兩個國家的監理單位在出租細分化市內用戶迴路方面較慢採取行動。由於 BT 最近決定促銷該項服務並降低價格，使得英國在市內用戶迴路出租的數量上有非常高的成長。

●透過與 backhaul 分封互連的方式接取網際網路

此係擁有用戶迴路之既有業者負責網路接取伺服器(network access server; NAS)之運作，並於 NAS 提供互連給競爭業者（或 ISP 業者），並由競爭業者提供 backhaul 服務給 ISP 的 POP(point of presence)。此又稱為 bitstream 服務。因為 DSL 之 NAS 通常位於或靠近既有業者之市話交換機機房內，因而分布在許多點，故特別須要 backhaul 服務。backhaul（NAS 與 ISP 間）連接可以以下三種方式達成：

- 1.直接連接至共佔設備—僅在撥接方式及只有一些 NAS 點時適用。
- 2.藉由專線作遠端連接—當有大容量的話務量時適用。專線可由既有業者或新進業者提供。
- 3.藉由提供 NAS 業者（通常為既有業者）之分封網路作遠端連接。對於 ADSL 而言，由於有許多 NAS 點，故此方式為唯一實際之作

法。

Backhaul 服務可使其他業者可較快與容易與既有業者競爭，其他業者可選擇 bitstream 與 Backhaul 服務作為進入市場之方法，當市場成熟後再轉移至用戶迴路細分化及共佔之互連，泛歐之 ISP 公司 Easyne 即是採用此策略之代表。

監理單位介入 bitstream 及 backhaul 之提供的兩個原因：

1. 希望儘早確保較高速接取的提供
2. 許多既有業者亦是主要的 ISP 服務提供者，因此在提供 bitstream 接取服務給 ISP 時可能會發生差別待遇。

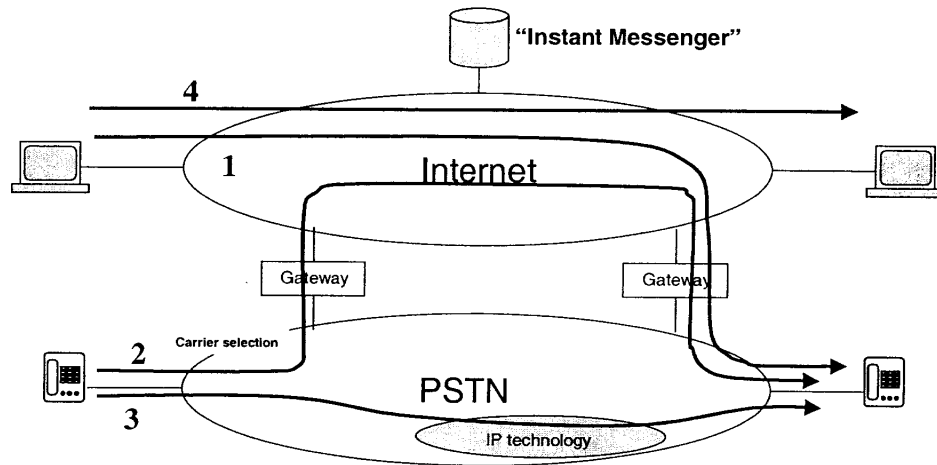
已介入實體用戶迴路細分化(physical local loop unbundling)之提供的監理單位傾向於由既有業者決定是否提供 bitstream 及 backhaul 服務。然到目前為止尚未有監理單位要求既有業者於提供 bitstream 服務給 ISP 時應一併提供細分化之 backhaul，使其他業者能有機會提供 backhaul 服務。然某些監理單位（例如 Oftel）正檢討目前實施之可行性。然而，backhaul 細分化之監理議題並不容易，其關鍵為既有業者在提供 backhaul 服務上是否為市場主導者而須受價格管制。監理者之可能選項如下：

1. 視 DSL 接取及 backhaul 的提供為一套裝（未細分化 backhaul），故可要求此套裝以成本計價，此作法有益於 ISP，但未給其他業者經營 backhaul 服務之空間。
2. 要求細分化 backhaul，故 DSL 在市話交換機處可以較便宜被提供，其他業者亦可提供 backhaul 服務，然而，監理者此時無法要求既有業者之 backhaul 服務以成本計價，因此時已無市場主導者，此作法有益於其他業者但無益於 ISP。

## ●VoIP

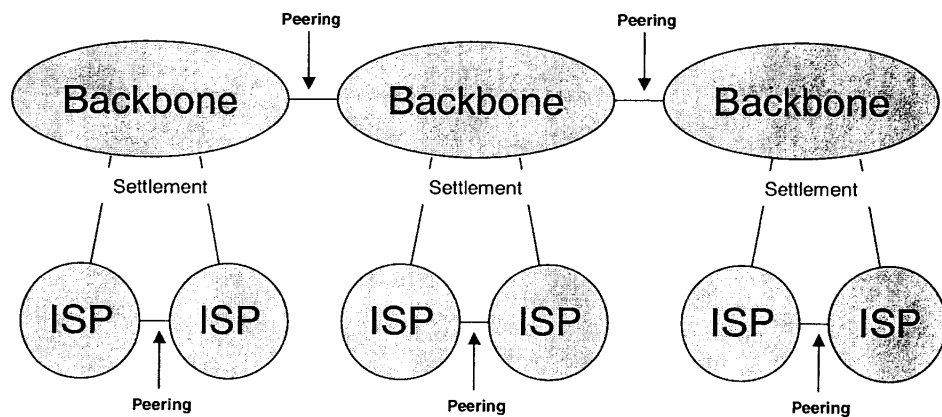
本課程對 VoIP (Voice over IP) 之歸納出四種類型如下，有助於釐清觀念：

1. 從 Internet 打電話至 PSTN 網路，PSTN 受話。
2. 使用 Internet 或其他 IP 技術提供 PSTN 之替代網路來處理 PSTN 之電話，其是透過業者預選、業者選擇或兩段式撥號來達成。
3. 使用所謂的軟體交換機為基礎之 IP 技術來提供 PSTN 服務。
4. PC 用戶間直接通信。



## ●網際網路間之互連

網路網路有很明確之垂直結構如下圖，最上層為大的網路網路骨幹提供者，如 UUNET、AT&T 及 C&W 等，中間層為許多較小的骨幹提供者，最下層則提供網路網路接取給用戶之 ISP。



網際網路提供者間有兩種互連安排：

1. 匹配 (Peering)：此方式沒有費用分攤，其是以平等為基礎，具有相似規模之網際網路提供者將採用此安排，其規模決定因素容量、話務量及話務平衡等。
2. 分攤 (Settlement)：互連促使當某一單位獲得較大利益，則此方式就會發生，通常較小的網際網路提供者付互連費給較大網際網路提供者，然而與 PSTN 不同的是，其費用是以容量計算而非以話務量計算。

網際網路互連之合約通常只有幾頁，跟 PSTN 之大本文件大為不同。

許多網際網路在第三者提供之特定地點上互連，ISP 藉由專線連接至這些特定地點，並在這些特定地點連接至其他 ISP 及骨幹網路，這些特定地點亦提供電力、空調及保養等服務。

因為網際網路使用 Border Gateway Protocol 來交換 IP 位址之資訊，故網際網路之互連安排較 PSTN 簡單，Border Gateway Protocol 使得邊緣路由器 (Edge router) 自動設定路由表，而 PSTN 卻必須利用人工來達成，Border Gateway Protocol 是網際網路成功之主要貢獻者，

其使得網際網路互連非常容易被建立及更新。

因而，網際網路成長非常快速，我們應密切注意其發展，並且改變傳統以 PSTN 為基礎之互連。

#### (七) 接續費計算模型

##### ●接續費的決定有下列幾種：

- 1.價格分享：每一互連通信互連業者按事先決定的百分比分享零售價格。此種方式適用於零售價格未反映成本且受價格上限管制。但此方式會阻礙價格朝成本方向降低。
- 2.營收分享：就某些觀點而言與價格分享類似，由互連話務總量的水準與乘上平均零售價格而得。

##### 3.Bill and keep (或稱之為發信端保有所有營收)：

對互連話務無需支付接續費，發信端業者向用戶出帳並保有所有零售之收入。此方式適用之環境為：

- 互連來去話務均衡且互連網路之成本類似；或
- 每一業者均有機會向用戶收取費用以回收所負擔之成本。

Bill and keep 常用於兩大小相似之固網業者間的市話通信，且互連來去間話務在容忍範圍內是平衡的。在某些行動通信受話端付費的國家，固網與行動電話間之接續費異彩 Bill and keep 方式。

##### ●依成本計價：

WTO 電信基本服務承諾及 APEC 互連原則均規定主要業者之互連服務應按成本計價。然成本的計算並非易事。有一些基本的選擇要決定，且對監理單位與業者而言，成本的計算雖是一數學的方法，但整件事情藝術的成份仍大於科學的成份。考量下列問題便可知依成



本計價之困難：

- 當科技的進步降低了設備的價格，我們要採用實際所付的價格，抑或是現行將付出的價格？
  - 當科技的進步改變了網路的架構，我們要採用實際的網路架構，抑或是現行將設計的網路架構？
  - 當既有業者爭論人工成本，我們要採用實際的人工成本，抑或是有效率的人工成本？
  - 當實際大部分的設備供應商的合約是協商決定，且細節屬商業機密，設備價格因需求及環境可能有很大差異時，我們要如何假設一設備價格？
  - 如何分配固定成本至不同的業務？
  - 允許之利潤要素為何？
- 接續費有兩種主要的成本標準—完全歸屬成本法(FAC)及長期增支成本法(LRIC)。當該業務已達充分競爭時，可考慮採完全歸屬成本法，當該業務未達充分競爭時，則可採長期增支成本法。於計算互連服務之成本時，僅計算與核心網路相關之成本，並包含適當比率的共同成本。與接取網路相關的成本應完全由市話月租費及設定費回收，不包含於接續費中。然某些國家之市話月租費受價格上限管制無法回收接取網路成本，而造成需由其他網路服務（例如接續費）回收市話接取之虧損。監理單位的趨勢是放鬆零售價格之管制，消除市話接取虧損及任何的市話虧損分攤，包括接續費中所含的市話虧損分攤。
  - 各種成本相關名詞：
    - 歷史成本：是網路業者實際所承受的成本。此成本反映實際投資購

置設備之成本，而非反映現今之需求、網路規劃與科技發展。由業者會計資料獲取成本資料。

- ▶現時成本：以資產重置之成本重估設備之成本。此成本用以反映以今日價格購置網路設備及系統以承載相關話務所需之成本。今日之購置決策包括獲得最適當的現今技術，而非以使用的老舊技術。可考慮以現時成本代替前瞻性成本。
- ▶前瞻性成本：用以反映業者現今投資選擇。此成本反映一有效率公司使用現今技術及新的機線設備。網路能被重新設計，以涵蓋期望網路擁有的潛在效率，並考量技術進步及人口變化對網路成長所造成的影響。如前所述，常以現時成本來近似前瞻性成本。
- ▶成本加成：在長期增支成本法中以合理加成回收業者於計算增支成本時未估算的部份或全部共同成本。採用某種形式的合理加成，係體認到規劃、管理及業者的其他系統均對以 LRIC 計算成本之服務的提供有所貢獻，應有適當的補償。
- ▶固定加成：係對所有服務採取相同百分比的加成，以反映共同成本佔全部成本的比率。此方法並不考慮不同服務間使用同一共同設備的差異。
- ▶效率元件訂價法：在已達完全競爭之零售市場，針對利潤較高的服務訂定較高的合理加成。
- ▶Ramsey 訂價法：合理加成的百分比與價格需求彈性成反比。理論上，此訂價方式可使需求極大化，但非常難以實行。
- ▶上下限法：此方法允許業者在既定的限制下自由訂定其合理加成。接續費依成本計價之重要目的，在於鼓勵經濟且有效率之投資，以促進消費者長期利益。而當市場失靈已發生或可能發生時，才有需

要監理單位介入接續費之訂定。接續費之設定應考量促使既有業者與新進業者在有效利用既有網路設施及投資建設新網路設施兩者間取得平衡。亦即短期而言促使既有設施之使用最佳化，就長期而言使網路設施之投資建設最佳化。此外，訂定較經濟成本為低的接續費，可促進下游零售價格之競爭，以使零售價格快速降至成本；然訂定較經濟成本為高的接續費，則可促進基礎設施之競爭(infrastructure-based competition)，但會有新進業者較慢進入市場之風險。然若缺乏基礎設施之競爭，則可能需持續對接續費做管制。因此，一般認為以有效率之業者使用既有網路架構之前瞻性長期增支成本，並以合理加成以回收長期聯合成本及共同成本來計算接續費較合理。

●三種評定接續費成本的方法及其優缺點分述如下：

➤國際比較法(Benchmarking)

由於某些國家之接續費中另有 call set-up 及 call attempt 費用，有些國家則無；有些國家之接續費按尖峰、離峰、白天、晚上、假日有不同的價格，有些國家則無；有些國家按距離、地區（首都、都市、地方、鄉村）訂定不同之接續費，有些國家則無；有些國家之接續費含連接埠之費用，有些國家則無。因此做國際比較時應將各國實際接續費率結構做適度之調整，或選擇與本國接續費率架構相同的國家。此外，由於人口密度、網路架構、資金成本、互連話務之水準及型態均為影響接續費成本結構之主要因素。

因此，做國際比較時，應儘量選擇與本國相類似之國家做比較。而更重要的是，要選擇與本國採用相同成本計算標準（例如：LRIC、FAC...等）之國家做比較。

- 1.優點：國際比較法提供在可比較之營運及市場環境中業者之接續費最佳實際情況，而業者之效率水準取決於該國之監理與商業環境。採用國際比較法所需之時間及成本最少。除可用以訂定起始接續費外，更可檢核以 Top down 或 Bottom up 成本模型所計算出之接續費。
- 2.缺點：業者在本國營運狀況與所選為國際比較之國家有所不同，且於調整各國接續費時難以將這些差異納入考量。此外，若持續依賴國際比較法，將難以揭露及檢視本國業者實際負擔之成本。因此，國際比較法僅適用於評估接續費之適當性，且須輔以其他方法。

#### ➤Top down 成本模型

Top down 成本模型以業者會計資料為基礎估算接續費。由會計資料做適度調整所獲得之現時成本可做為以 FAC 或 LRIC 計算接續費之基礎。能使用成本劃分及會計分離定義相關成本。

- 1.優點：Top down 成本模型是唯一根據本國業者實際會計資料計算之方法，可提供強有力的審核途徑。
- 2.缺點：受限於過去的網路設計及業者營運現況，Top down 成本模型無法完全考慮到潛在的效率改進。需耗費大量的投資以建立所需之成本會計系統，且因成本無法以 LRIC 的形式記錄，因此採用 LRIC 所需之投資比 FAC 還大。此外，因業者係使用實際成本，會發生涉及商業機密的問題。當監理單位公佈決定接續費之相關數據時會有無違反商業機密的風險。

#### ➤Bottom up 成本模型

Bottom up 成本模型係依據業者網路之理論工程模型。進行網路設

計時可選擇之網路架構有：一、四周未開發地區之網路架構 (Greenfield network topology)：以滿足現行需求為前題設計成本最低之網路。二、焦土節點網路架構(scorched node network topology)：採用業者現行網路交換設備所在之節點位置，但允許採用最新設備及成本替換現行設備的成本，亦即換掉節點上的設備。

1.優點：需取得之業者資訊最少，且由於成本係採預估方式，可考量理論上之技術效率及營運效率。若採焦土網路設計，則網路的實體接取的位置與現況相符，例如交換機房及市話線位置未改變，但允許網路元件以更加的方式重新設計與規劃。Bottom up 成本模型同時亦避免觸及機密資料。

2.缺點：Bottom up 成本模型與業者實際成本無關，且通常低估成本。因為成本模型假設網路已依過往的需求及市場條件重新設計。實際上網路設計及建置時，業者會參考未來預估需求，而非僅既有的需求，因此會超估話務需求之現象。然 Bottom up 成本模型係事後諸葛亮，因此不允許將未來話務之需求納入考量。發展 Bottom up 成本模型非常昂貴，且具有難以檢核及複雜難懂的特性，並對營運成本難以估算。

●有關成本模型結論如下：

Top down 成本模型係以業者會計資料為基礎，所算出之接續費為提供互連服務所能獲取之最高金額。Bottom up 成本模型以網路設計安排為基礎，理論上並非反映所有業者的不確定營運環境。係指在理論上最佳情況下的接續費，因此為接續費之最低值。國際比較法則提供其他國家之實際接續費，且根據研究這些接續費將有逐漸下降之趨勢。

實際上三種成本模型應交互運用以克服每一種模型的缺點。然受限

於時間及資源，既有業者會以其實際成本為基礎計算接續費並提出所蒐集研究的國際比較接續費。新進業者會採用無須既有業者會計資料的 Bottom up 成本模型計算接續費，並提出所蒐集研究的國際比較接續費。

不管成本模型及國際比較能獲得資料的複雜度及詳細程度，其結果始終是個估計值，更典型的是一個範圍值。因此，在業者建構模型或國際比較時，以及對結果的詮釋與適用上，監理單位需行使其裁判權。如何決定接續費的設定是監理單位在考慮許多複雜議題後該做的選擇，而非一項自動的計算。藉由接續費每年重新計算，提供改正錯誤及修正市場扭曲的機會。

- 成本計價時其他重要議題：於計算依成本計價之接續費時，涉及之其他議題包括棄置資產(stranded asset)、資金成本率(Returns of capital)及資產折舊(asset depreciation)，茲分述如下：

- 棄置資產

所謂棄置資產係指已購置但已無法創造利潤之資產。就會計上而言，資產價值應反映該資產所能產生的營收，而棄置資產係初始成本尚未完全實現前即被認定無價值之資產。茲以下述例子說明棄置資產可能發生的情況：

監理單位要求既有業者 ABC 公司提供 E1 或 T1 互連電路給新進業者。然為減低新進小業者的成本負擔，監理單位對互連電路及連接埠之費用加以管制，並要求以長達 15 年的折舊年限計算成本費用。但新進業者對互連電路之需求不大可能超過 5~7 年，且即使超過 5~7 年，所需互連電路數量亦與現今不同。因為可以預期的是，現今承載的互連話務的 E1 或 T1 互連電路在未來會被寬頻電路取代。因此該互連電路在 5~7 年內可能成為棄置資產，而 ABC

公司僅能回收部份的投資。然損失的部份究由 ABC 公司承擔抑或是由互連業者承擔，此一問題並非特別複雜，只是監理單位並不喜歡藉由縮短資產壽年提高接續費的方式回收較高的每年成本。

ABC 公司在正常營運中採用商業上價格與業務間交互變更的方式降低技術上的風險程度。然而 ABC 公司卻被要求在特定地點及時程內提供一定量的 E1 及 T1 互連電路，而無法藉由價格機制控制互連相關資產之投資風險。

#### ➤ 資金報酬率

電信屬資本密集的行業，而大部分的資金係用於機線設備的投資。因此，接續費成本模型中允許納入的資金成本係影響接續費計算結果的重要因素。不同的加權平均資金成本(weighted average cost of capital; WACC)顯著影響以分鐘計費的接續費。

監理單位在這方面有幾種選擇，包括：接受既有業者提供互連服務之實際資金成本；或參酌類似風險程度的競爭市場以決定資金成本。

依成本計算接續費時常誤用既有業者的實際資金成本。當既有業者屬政府擁有或政府默許保障營收時，會使成本扭曲。由於享有較低的風險等級，壓低了負債資產的成本。因為公司部分或全部的股利政策被政府掌控，可能反映政策或社會的需要，而非商業現象，普通股的成本可能被誇大。既有業者的資金成本有可能反映其近期之獨佔地位及缺乏競爭。總而言之，相較於商業資本市場，實際資金成本有可能偏高或偏低。

#### ➤ 資產折舊

於計算接續費成本允許將業者的資金報酬率包含在加權平均資金

成本(WACC) 中。而業者資金報酬率涉及互連相關設備所允許的資產折舊年限。若監理單位同意短的資產折舊年限，將提高接續費中的折舊成本。另一方面，較長的折舊年限將降低接續費。而決定資產經濟壽年時要考量棄置風險及技術更新等因素。

在此 Ovum 依據其經驗列出的資產壽年水準適用於互連及符合監管目的。然而該折舊年限係適用於穩定環境的電話網路。折舊年限可能受大規模技術更替所影響，例如寬頻網路或下一代網路。

資產	折舊年限
管道	50
管道內的銅絞線	18
埋在地下的銅絞線	15
管道內的光纖	25
埋在地下的光纖	20
無線電系統	15~20
數位用戶傳輸設備	9
數位多工器及光纖系統	9~12

#### (八) 互連協議書及參考範本

簽訂互連協議書後方能於兩業者間實際傳遞互連話務。而具法律拘束力之互連協議書內容則涵蓋兩業者在商業、技術及營運等方面的權利與義務。基於以下理由，互連協議書是既有業者、新進業者及監理單位關注的焦點：

- 既有業者擁有的協商力量比新進業者強得多
- 以公平合理的條件與既有業者互連是競爭的必要條件
- 幾乎所有新進業者在進入市場時均希望與既有業者直接互連，但



到後來才會與其他業者直接互連。

在規管架構允許下，透過商業協商方式獲致之互連條件（包括計費結構）有最大的彈性。既有業者可能提出標準的互連條件，新進業者可以接受或作為開始協商的基礎。然若缺乏其他規管壓力，既有業者將比新進業者擁有更多的討價還價力量。由於新進業者對互連的商業需求較既有業者為高，且新進業者與既有業者間存在著資訊不對稱的情況。因此規管架構可能賦予監管單位在某些協商場合或協商失敗時，對互連條件（包括價格）進行裁決的權力。為符合對產業透明化之目的，裁決之結果常可公開取得。

監理單位可能在協商前作一原則性裁定，以適用於希望和既有業者互連的所有業者。或者，先由業者協商，於無法達成協議時方尋求監理單位的裁決。監理單位所作的裁決可能僅適用於爭議的雙方或擴大適用於所有業者。

若希望先由業者協商，監理單位可能會事先公佈解決爭議的計價準則，以降低業界的不確定性並幫助業者達成協議。

為確保互連的公開及無差別待遇，許多國家的監理單位要求既有業者公佈互連參考範本(Reference Interconnection Offer; RIO)。監理單位可能對 RIO 進行調查及審核。一旦核可，參考範本即對既有業者具拘束力。通常 RIO 被要求每年更新及重新審核。若 RIO 未被核可，監理單位會要求既有業者修正 RIO 後重新提出或依權限逕予修正 RIO 後核可之。一般僅要求公佈既有業者或具市場力量之業者的 RIO。RIO 通常還需要有額外的詳細資料方能產生完整的互連協議書，而這些額外資料是屬於較不可能發生爭議的項目。為符合透明化及對產業界及潛在新進業者的確定性，通常由既有業者或監理單位公佈 RIO（包括價格）。

RIO 是一個不超過 10 頁的簡要文件，內容包括：

- 各種互連相關服務文件的指引
- 各種互連方式（例如 In span 互連）
- 新進業者使其網路與既有業者相容的原則
- 已提供之主要互連服務及其價格之清單，以及於網路介接點各項服務之話務分離的方法
- 建立網路互連的預期時程指標
- 針對各項服務，雙方訂購互連容量的責任
- 以圖解法簡要表示建立互連的程序，包括每一步驟所需時間
- 以圖解法簡要說明預測及訂購(forecasting and ordering)的程序
- 可做為互連介接點的詳細說明
- 發票週期及付款許可時間的提醒
- 一些主要的連絡窗口
- 可取得更詳細資料的地方

RIO 保持簡短可使高階經理人及監理單位容易閱讀，亦有助於與新進業者先期討論。

互連協議書是一份長的法律文件，並含下列四項附錄以補主協議書之不足：

➤ 附錄 A：提供及營運

提供手冊內容包括：建立網路介接點、預測及訂購、服務提供前的測試、作業程序、預測及訂購的形式。

營運手冊內容包括：話務的處理、故障處理程序、維護、解決故障之測試、值機員服務。

➤附錄 B：帳務處理及付款

蒐集呼叫記錄、開發票、付款、爭議

➤附錄 C：各項服務及其價格

➤附錄 D：技術規格說明

詳述介面規格及相容性測試

為使所有有興趣的團體易於取得 RIO 及標準互連協議書，且考量資料頁數很多，這些文件應以容易下載的方式公佈於網站上。這些 500~1000 頁的文件可能包括 50 個以上的檔案（例如 BT 的文件），且價目表與服務描述分開放置。為避免造成新進業者在瞭解上及既有業者在文件更新上的困擾及費時，文件中常輔以超連結的方式進行交互參考。

以下列出可公開取得 RIO 或互連協議書之網站：

➤法國：法國電信公司之 RIO

<http://www.francetelecom.com/vfrance/pdf/L33-1-2002.pdf>

➤德國：Deutsche Telekom 的 RIO

[http://www.telekom.de/dtag/ipl1/cda/level3\\_a/0,3680,161,00.html](http://www.telekom.de/dtag/ipl1/cda/level3_a/0,3680,161,00.html)

Reg TP 之現行費率

<http://www.regtp.de/aktuelles/02285/01/index.html>

➤日本：東 NTT 及西 NTT 之 RIO

<http://www.ntt-east.co.jp/info-st/e/constip/cons1/index.html>

➤紐西蘭：紐西蘭電信公司互連協議書

<http://www.telecom.co.nz/content/0,2502,200656-1553,00.html>

➤新加坡：SingTel 之 RIO（無實際費率）

IDA 網站之”Policy and Regulation”，”Interconnection & Access”  
，及”Reference Interconnection Offer”連結

➤美國：FCC 網站可取得之匯集各業者費率

[http://svartifoss2.fcc.gov/cgi-  
bin/ws.exe/prod/ccb/etfs/webpublic/selectlec.htm](http://svartifoss2.fcc.gov/cgi-bin/ws.exe/prod/ccb/etfs/webpublic/selectlec.htm)

➤英國：BT 公司的 RIO

<http://www.btinterconnect.com/refoffer.htm>

## 參、心得與建議

- 一、首先謝謝局方提供職等難得機會參與 APECTEL 在印尼雅加達舉辦的兩場講習受益良多。透過澳洲 OVUM 公司安排專業講習，對於「電信普及服務」之整體概念有更進一步的體會，從原只是侷限於對本國普及服務實施的了解，開啟更寬廣視野以更宏觀角度了解普及服務發展緣由到世界各國基因於國家歷史文化背景不同，進步發展實況各異，採行普及服務時間點、進程及採行種類及方式自不盡相同。例如主辦國印尼尚未提供普及服務目前係處於法規制定階段、泰國實施尚未電信自由化、馬來西亞則較我國早一年從 2001 年起實施；反觀美國、英國、澳洲等先進國家則已實施經年。以美國為例，普及服務提供範圍廣、種類多、受益對象廣被、管理企業化，值得我們學習的楷模。在預算許可範圍內，建議局方多提供同仁出國研習吸收新知機會，俾對本身業務能有更多體認與建樹。
- 二、職等利用休息時間向印尼、馬來西亞、泰國及巴布新幾內亞等國參加人員詢問該國電信開放現況，得知台灣之開放程度、普及率及法規健全度等皆是超越他們，這是值得我國驕傲的。惟從訓練中，各國參加人員積極學習及參與討論的態度，可感受這些國家積極改善該國現況以趕上世界潮流之心，因此，我國應持續積極建立公平而有有效之競爭環境，以維持我國之競爭力。此外，各國之業者參加人員遠多於監理者參加人員，因為其業者皆主動提供有效資訊及建議方案給監理者，我國本次並未有業者參與，建議以後有類似機會可知會業者參加。
- 三、本次互連講習會 Ovum 除了提供相當豐富的互連相關資料外，亦安排了演練課程，透過角色扮演的方式加深與會人員對互連協商

的了解，職等從演練過程中深深了解到新進業者須處於攻擊角色卻又相當弱勢的局面，彷彿是一個不得和巨人打架之小孩，例如，既有業者雖願與新進業者協商但可用各種方式拖延談判，或要求新進業者提出其事業計畫以決定其 POI 點及互連容量等，新進業者應謹慎以對以免落其陷阱，此外，新進業者要靠互連法規及監理者之介入等武器方得平等談判，故在開放初期，監理者之角色與權力是相當重要的。

- 四、本次互連講習會 Ovum 亦特別介紹新服務及新技術可能產生之互連議題，例如獨立內容提供者提供 SMS 或 MMS 服務時與行動業者互連之問題；當同一網路提供多種或跨國服務時，如何界定市場主導者；新服務之互通性及 VOIP 對既有以傳統網路為基礎的法規之適用性等，其雖未提出具體解決方案，惟監理者應密切注意其發展趨勢與先進國家作法，以規劃出適合我國之政策及法規。
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# 附 件

**Document: 8**  
**Session: 8**  
**Case Studies**

**1 INTRODUCTION**

The case studies have been selected to illustrate a range of different approaches to the funding and administration of universal service under conditions in separate jurisdictions. The material in the case studies has been drawn from public sources and Ovum's own research. It does not necessarily represent the views of the national administrations concerned.

**2 SCOPE OF UNIVERSAL SERVICE**

The scope of Universal Service in a range of countries is illustrated in Figure 2.1. The important point to draw from Figure 1 is the similarity of the scope from country to country, rather than the limited set of differences.

FIGURE 2.1: SCOPE OF UNIVERSAL SERVICE IN SELECTED COUNTRIES

<i>Universal service</i>	<i>Aus</i>	<i>Can</i>	<i>Fr</i>	<i>Ger</i>	<i>It</i>	<i>Sp</i>	<i>UK</i>	<i>USA</i>	<i>Kr</i>
Affordable basic telephony	yes	yes	yes	yes	yes	yes	yes	yes	yes
Adequate provision of payphones	yes	no	yes	yes	yes	yes	yes	no	yes
Free access to emergency services	yes	yes	yes	yes	yes	yes	yes	yes	yes
Provisions for disabled and low income groups	yes	yes	yes	yes	yes	yes	yes	yes	yes
Access to DQ/operator services	yes	yes	yes	yes	yes	yes	yes	yes	no
Other services								(2)	(1)

(1) Service to coastal shipping. Islands service is part of providing affordable basic telephony  
(2) Libraries, schools and rural health care programmes

- General agreement on core set of universal services
- Main exceptions:
  - Korea excludes DQ service
  - USA and Canada exclude payphone provision

Source: Ovum

**3 COST OF UNIVERSAL SERVICE (**

As shown in Figure 3.1, based on information from 1998, the cost of universal service as a proportion of total telecommunications service revenues, differs from country to country but is typically in the range 0.5 – 2.0%.



collect ANVRA/  
~~several~~ years ago

FIGURE 3.1: UNIVERSAL SERVICE COSTS RELATIVE TO TOTAL TELECOMS REVENUES FROM SELECTED COUNTRIES

Country	Universal Service Cost as a % of Total Revenue
Australia	2.0
Norway	2.0 – 2.4
United Kingdom	0.5 – 0.6
Sweden	0.8 – 1.2
Chile	0.5
Peru	1.0

Source: World Bank, 1998

#### 4 ACCESS AND AFFORDABILITY

Universal service is about providing access at affordable prices. The World Bank has published estimates, based on per capita GDP variations and per line investment levels, the population size necessary to support public telephones in rural areas (see Figure 5.1). These services are the primary subject of Universal Service Schemes in developing economies.

FIGURE 5.1: POPULATION NEEDED TO SUPPORT ONE RURAL PUBLIC TELEPHONE

Country	Rural GDP per capita, \$ US	Investment per line, \$ US	Population
Kenya	130	4,000	650
Peru	790	10,000	339
India	180	2,000	277
Botswana	1,300	4,000	200
Bangladesh	150	1,000	169
Hungary	2,200	1,200	14
United Kingdom	9,800	2,000	5

Source: A. Dymond, World Bank, 1998

## 5 AUSTRALIA

*Note that all monetary amounts are in Australian dollars.*

### 5.1 Basic Demographics

GDP: \$166 billion (2001)

Population: 19.4 million (2001)

Land area: 7,687,000 sq. km

% of population living in urban areas: 84.7% (Euromonitor 2000 World Marketing Database)

Distribution of income in Australia (GINI): 35.2 in 1994 (World Bank 2001)

### 5.2 Industry Structure

Telstra is the incumbent Australian telecommunications carrier providing a full range of fixed, data and mobile services at the wholesale and retail levels.

The major competitors to Telstra in the fixed and data markets are:

Optus (owned by SingTel)

AAPT (owned by Telecom New Zealand)

Primus (owned by Primus in the US).

Optus has taken a broad customer target focus, aiming at both residential and business customers. AAPT and Primus have concentrated more on government, corporate and medium business enterprise customers, though both also have residential retail offerings.

Telstra provides 8.75 million retail residential and business basic access lines, and 1.3 million basic access lines on a wholesale basis. Optus provides 450 thousand telephony access lines. Telstra provides 96% of the Australian basic telephony services on either a retail or wholesale basis.

The market shares for national long distance and international are shown in Figure 5.1.

FIGURE 5.1: NATIONAL LONG DISTANCE AND INTERNATIONAL MARKET SHARES

	<i>National Long Distance</i>	<i>International</i>
<b>Telstra</b>	<b>75%</b>	<b>48%</b>
<b>Optus</b>	<b>16%</b>	<b>18%</b>
<b>AAPT</b>	<b>6%</b>	<b>6%</b>
<b>Other</b>	<b>3%</b>	<b>28% (fragmented)</b>

Source: Ovum estimates of 2001 revenue shares

In the local telephony market for 2001, Telstra carried approximately 41 billion minutes of local traffic compared to approximately 1.6 billion minutes of local traffic by Optus.

The competing mobile carriers are Optus and Vodafone, and to a lesser extent Orange (Hutchison Telecom), which launched a CDMA network in mid 2000. At the end of 2001, the market shares (in terms of numbers of subscribers) of the mobile carriers were 46% (Telstra), 34% (Optus), 18% (Vodafone), and 2% (Orange).

### 5.3 Market statistics

Fixed lines: 10.1 million (2000)

Public payphones: 78,000 (2000)

Mobile subscribers: 12.0 million (end 2001)

Total telecommunications services revenues for Australia: \$29 billion (2001)

### 5.4 Prices of the USO provider

*Telstra's default retail prices for basic telephony*

Standard residential line rental: \$19.90 per month

Standard business line rental: \$31.95 per month

Neighbourhood call<sup>1</sup>: 15 cents untimed

Local call: 22 cents untimed

Local payphone call: 40 cents untimed (regulated ceiling)

Three minute standard peak national intercapital call: \$0.94 (Residential Melbourne – Sydney).

Directory assistance is provided free of charge for fixed residential customers and for payphones. Directory assistance for business and mobile customers is charged at 44 cents per call.

Telstra offers a range of different retail packages providing a tradeoff between line rental prices and per call prices. Most packages also include a range of call price caps for long distance (national and international) and fixed-to-mobile calls made during defined off-peak periods.

In April 2002, the Australian government modified the retail price cap arrangement that applies to Telstra. Telstra is now allowed to increase its overall line rental prices (as defined through a line rental basket) at a capped rate of CPI+4%. This allows Telstra to achieve tariff rebalancing over an estimated four year period to eliminate the access deficit on residential services that currently exists. Over the four year period, it is expected that Telstra will increase the standard residential line rental from \$19.90 to approximately the level of the standard business, or about \$32.

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<sup>1</sup> Calls between Telstra services connected to the same exchange.

## 5.5 Legal Basis for Universal Service

Prior to network service competition being introduced to Australia in 1991, universal service was funded through internal cross subsidisation of services within Telstra's predecessors (The Post Master General's Department and Telecom Australia). The **Telecommunications Act 1991** granted Optus a telecommunications licence in 1991 and established explicit universal service obligations and funding through a universal service levy.

This was further revised in 1997 with the **Telecommunications Act 1997** and the opening of the Australian telecommunications market to full competition.

The current regulatory framework for universal service is defined in the **Telecommunications (Consumer Protection and Service Standards) Act 1999**. Key elements of this act are:

- the Universal Service Obligation (USO)
- the Digital Data Service Obligation (DDSO)
- the selection of Universal Service Provider (USP), including contestability
- regulation of retail charges for services covered by the USO and DDSO
- arrangements for funding of the USO.

Implementation and oversight of the USO and of the universal service subsidy payments are handled by the Australian Communications Authority (ACA) and the Department of Communications, Information Technology and the Arts (DCITA).

Links to the relevant Australian legislation can be found at <http://www.aca.gov.au/legal/index.htm>

## 5.6 Scope of Universal Service

The USO is the obligation to ensure that:

- standard telephony services
- payphones
- and prescribed carriage services

are reasonably accessible to all people in Australia on an equitable basis. However, no carriage services<sup>2</sup> have been prescribed to date.

The standard telephony service is the provision of a voice grade telecommunications service, or the equivalent for people with disabilities. The standard service includes access to directory assistance, emergency calls and untimed local calls and is covered by the customer service guarantee<sup>3</sup>.

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<sup>2</sup> A carriage service is simply a service for carrying communications.

<sup>3</sup> The Customer Service Guarantee includes minimum fault repair and connection times.

While no determinations have been made regarding retail charges for universal services, the general retail price controls applying to Telstra provide control of the universal service retail charges.

There are currently no plans to change or add to the scope of the USO.

### **5.7 The Universal Service Obligation**

Telstra is the only declared USP at this stage. However, as outlined below, a contestability trial is currently underway. USPs are obligated to provide service on request. USPs must submit a policy statement and a marketing plan for approval, outlining their arrangements for fulfilling their obligations.

The DDSO is a separate arrangement and is not considered as part of the USO. It is separated into a general and a special DDSO.

The general DDSO requires the provision of a data channel with a transfer rate of 64 kbps to all customers in declared general DDSO areas

The special DDSO specifies a downstream data channel of 64 kbps to all customers in declared special DDSO areas.

The requirement is essentially for an ISDN or equivalent service in practice. About 96% of the Australian population is covered by the general DDSO, with the remainder covered by the special DDSO. The area covered by the special DDSO is defined by the government and may be changed on an annual basis. The special DDSO involves subsidy payments to the special DDSO provider on a per customer basis. This subsidy covers 50% of the upfront customer equipment and installation costs (such as a satellite dish) up to a capped amount of \$765.

Telstra is the national general DDSO provider. Both Telstra and Optus are special DDSO providers, and meet this obligation using a satellite data service. The DDSO has not been successful in the level of customer applications, with a total 2000-2001 DDSO subsidy of \$124,000. With the subsidy only covering up to half of the upfront costs, there is still a lack of perceived value for money by the customers covered by the special DDSO.

### **5.8 Contestability**

In March 2000 the Government announced its intention to trial a new contestability arrangement for the provision of the USO. Two pilot areas in rural regions were selected for the trial which will be conducted over a three year period followed by a public inquiry.

The key policy objectives for USO contestability are:

increased benefits to consumers in terms of pricing, service innovation and service quality

improved infrastructure and regional investment, including employment

more equitable access to USO subsidies

reduced underlying costs of provision of USO services.

A series of determinations were made by the Minister in April and June of 2001 to allow contestability. These determinations declared:

- the standard telephony service to be contestable
- the universal service areas within the pilot trial boundaries
- the level of subsidies payable per service in each universal service area
- the circumstances under which subsidies are payable.

Telstra remains the primary USP and must offer service to all customers in the contestable pilot areas. Other carriers may be approved by the ACA as competing USPs on the basis of their technical and corporate competence and experience as relevant to their service offering. Approval requires the submission of a policy statement and marketing plan. Competing USPs will be allowed to enter and exit the market at their discretion. Competing providers have the option of supplying an alternative telecommunications service with fewer regulatory requirements than the standard telephony service.

Per service subsidies range from \$150 to \$1,920 per service for 2001/2002 depending on the specific universal service area. The per service subsidies are payable to the retail USP that meets the USO. In universal service areas with no competing USP, the primary USP, Telstra, may choose to receive a lump sum subsidy for that area.

At this stage no application for competing USPs for the pilot areas have been made. Potential competing USPs apparently do not see a justifiable business case for being a competing USP with the current level of subsidies.

## 5.9 Extended Zones

In October 2000 the Government invited tender bids for the provision of untimed local calls and upgraded services in the extended zones of Australia. This included a local rate call to at least one Internet service provider. The extended zones are call charging zones that lie outside Telstra's standard local call charging zones. They cover about 80% of Australia's land area and contain approximately 40,000 telephone services.

Funding for this initiative of \$150 million was provided separately from the USO funding arrangements and was provided from the proceeds of the second sale by the Government of shares in Telstra. Telstra was selected as the successful tenderer on the basis of the level of service offered for the fixed \$150m price, and will provide the service for a period of ten years.

## 5.10 The Cost and Benefits of the USO

### USO Costs

Prior to 2000, the formula for calculating the cost of the USO was included in the *Telecommunications Act 1997*. The basis for this calculation was a net cost approach. Each year, the ACA declared certain net cost areas for which USPs can claim USO funding. Within each net cost service area the net cost was calculated as:

- the cost avoided in not serving the net cost service area

- *less* the revenue forgone in not serving the net cost service area.

The USP was allowed to claim actual avoidable costs (rather than the costs of an efficient carrier), but the Government reserved the right to reduce these costs if there were considered to be in excess of widely accepted benchmarks such as common industry practice or world's best practice. The costing studies undertaken by the ACA calculated avoidable costs on the basis of long run incremental costs assuming industry best practice on a forward looking basis.

The setting of the USO subsidy has been controversial. For the 1997/1998 year:

- Telstra claimed a net USO cost of over \$1.8 billion
- the Minister exercised powers under the Act to cap the USO subsidy at \$253 million
- the ACA assessed the USO cost at \$548 million based on its own study
- the legislative cap remained the basis for which the USO subsidy was set.

Telstra's claim for the 1997/1998 was based on data derived from Telstra and using a costing model developed by Bellcore International Inc under an agreement with Telstra, Optus, Vodafone and the ACA. Prior to the 1997/1998 financial year the net USO cost amount was determined by negotiated agreement between Optus, Telstra and Vodafone. The negotiated amount for 1996/1997 was \$251.56 million.

The two most significant factors leading to the substantially lower ACA assessment of the net USO cost versus Telstra claim were:

- the ACA used a significantly lower WACC compared to Telstra. The pre-tax nominal WACC estimated by the ACA consultants was 9.0% for 1997/1998. While the WACC used by Telstra was not made publicly available, estimates from comments made by the ACA suggest it was approximately 15-16%.
- Telstra only considered cable and one radio solution (Digital Radio Concentrator System) in its mix of technologies for meeting the USO, while the ACA used a mix of cable, terrestrial radio and satellite technologies. This led to a lower estimated installed network cost to meet the USO.

A major factor leading to the USO subsidy being set below the ACA's estimate of net costs was the intention that USO payments should not present a barrier to entry for new carriers. In particular, 1997 was the year that full competition was introduced to Australia, and avoiding a large increase in the USO subsidy at this critical point would have been an important consideration of the Minister.

Among other changes, the *Telecommunications (Consumer Protection and Service Standard) Amendment Act (No. 2) 2000* removed the formula for calculating the USO cost. Following this amendment the Act now provides for the Minister to determine USO subsidies from the 2000/2001 financial year onwards having regard to the advice of the ACA. The Minister can determine the USO net cost subsidies up to three years in advance. The Minister is no longer bound to use a legislated methodology to calculate subsidies. The assessment made for future years are in line with the 2000/2001 subsidy amount and are not related net universal service costs as estimated by the ACA.

### 5.11 Benefits of being the USP

The ACA conducted a study in 2000 into the intangible benefits of being the USP. These benefits are in addition to the direct revenues received as a result of providing universal services. Intangible benefits of being the USP were found to include:

*life cycle effects* – the potential for unprofitable areas to become profitable over time

*ubiquity* – when customers move to another area they will have a preference for their current provider

*brand enhancement and corporate reputation*

*payphone advertising and logo display*

*volume discounts* – the additional volume in purchases for USO services leading to an additional increment of discount

*non-USO services* – the ability to provide non-USO services through the infrastructure required for USO requirements.

In the event, the ACA considered the quantum of such benefits to be either too speculative, or in some cases, immaterial. Consequently, the value of intangible benefits were not used in the calculation of the net cost of the USO.

### 5.12 The Universal Service Fund

The universal service funding process is managed by the ACA. It assesses both claims for USO subsidies, as well as calculating the proportion of the subsidy to be met by each carrier. The net universal service cost is met by the telecommunications industry. Currently this is met only by licensed carriers, although the ACA announced in 2000, but has not yet implemented, that this would be extended to also cover Carriage Service Providers<sup>4</sup>.

Prior to the 1997/1998 financial year, the net cost of universal service provision was apportioned amongst the industry on the basis of timed telecommunications traffic. From 1997/1998 an eligible revenue approach has been used.

Carriers wishing to make a claim for the USO subsidy must submit their claim to the ACA within 45 days after the end of the claim period. The ACA is then required to make a written assessment of the claim, which can include the following information:

- the USO subsidy to which the USP is entitled
- the DDSO cost to which the digital data service provider is entitled
- the total of all subsidy credits to which the service provider is entitled

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<sup>4</sup> An operator that supplies carriage services to the public using the network facilities of one or more networks.



- the USO liability of the service provider in the last eligible revenue period *before* the end of the subsidy claim period.

The ACA collects written financial information from carriers related to their eligible revenue. The eligible revenue is calculated as the gross sales revenue of the carrier and its related parties *less* a series of revenue and expense deductions, (such as inter-carrier interconnection payments). The amount each carrier contributes to the cost of providing the USO and DDSO is based on each carrier's' eligible revenue as a proportion of the total eligible revenue of all carriers.

The fund is a virtual one. There is no accumulation of a balance requiring investment or management as in some other countries.

### 5.13 Administration of the Universal Service Fund

The universal service funding process is managed by the ACA. The Minister can set the level of the USO subsidy up to three years in advance. The USO subsidy levels for the 2001/2002 to the 2003/2004 financial years are shown in Figure 5.2. The DDSO costs are calculated at the end of each relevant period and are in addition to the amounts shown in Figure 5.2.

FIGURE 5.2: AUSTRALIAN USO SUBSIDIES FOR THE 2001/2002 TO 2003/2004 YEARS

	2001/2002	2002/2003	2003/2004
Extended Zones	\$35,015,000	\$31,666,000	\$28,637,314
NSW/QLD contestability pilot area	\$17,656,787	\$14,679,660	\$12,204,509
SA/VIC contestability pilot area	\$16,575,439	\$13,377,799	\$10,808,774
Remaining (default) area	\$160,592,774	\$163,978,541	\$169,407,828
Payphones	\$10,160,000	\$10,398,000	\$10,641,575
Total	\$240,000,000	\$234,100,000	\$231,700,000

Source: Universal Service Subsidies (2001-02, 2002-03, 2003-04) Determination (No. 1) 2001, Department of Communications, Information Technology and the Arts.

For the 2000/2001 financial year, the ACA made the written assessment *Universal Service Assessment 2000-2001*. The total USO subsidy and DDSO costs, incurred solely by Telstra, were assessed to be \$299,049,268, broken down in Figure 5.3, of which Telstra received a levy credit from the USO funding arrangement of \$69,965,622. This is based on Telstra having approximately 77% of the total industry eligible revenue and therefore being responsible to cover 77% of the assessed USO subsidy and being entitled to receive the remaining 23% of the assessed USO subsidy from the other carriers.

With an estimated total Australian telecommunications services revenue for 2000/2001 of \$29 billion, the net universal service cost is estimated to be 1% of industry revenues. Figure 5.4 shows the USO credit assessment for Telstra and the levy assessments on other carriers. The Contribution column shows the percentage of the total USO subsidy of \$299,049,269 for which the particular carrier is responsible.

FIGURE 5.3: AUSTRALIAN 2000/2001 USO SUBSIDY AND DDSO COST

USO – standard telephone service	\$288,931,000
USO – payphone	\$9,994,000
DDSO cost	\$124,268

Source: Universal Service Assessment 2000-2001, Australian Communications Authority

FIGURE 5.4: AUSTRALIAN 2000/2001 USO LEVY ASSESSMENTS

	<i>USO Assessment</i>	<i>% Contribution</i>
USP		
Telstra	\$69,965,622 credit	77%
Non-USPs		
AAPT	\$5,103,920	2%
Optus	\$43,041,252	14%
Primus	\$2,138,461	1%
Other Carriers	\$19,681,989	7%

Source: Universal Service Assessment 2000-2001, Australian Communications Authority

#### 5.14 Uneconomic Areas

The ACA determines on a yearly basis the net cost areas for which universal service funding will be available. The different types of net cost areas are:

- small exchange service areas
- built-up areas
- non-built-up areas
- premises to which radio services were supplied and
- payphones.

Net universal service costs are estimated on an avoidable costs minus revenue foregone basis. The most significant inputs to the avoidable cost estimates are:

- opportunity cost of capital
- installed costs of technology
- depreciation rates
- mix of technology, and
- operating expenses

In calculating the capital costs, pre-tax nominal WACC values of approximately 10% for the contestable areas and 7.7% for the extended zones and remaining areas have been used for the 2000-2003 period.

Revenue foregone includes:

- incoming and outgoing call revenue
- line access
- local and long distance
- directory assistance (from business customers)
- free phone
- ISP
- mobile (to and from fixed phones) and
- payphones.

#### **5.15 Uneconomic Customers**

Uneconomic customers are not considered separately from uneconomic areas for the universal service purposes. There are, however, separate requirements through retail price cap arrangements for Telstra to provide services to particular groups of disadvantaged customers. The net costs of these services are not considered in the context of the universal service fund and subsidy payments.

#### **5.16 Uneconomic Payphones**

Telstra operates about 35,000 of Australia's 75,000 public payphones. Approximately half of these are in non-metropolitan and rural areas

#### **5.17 Directory Enquiries**

Directory enquiries (DQ) from residential fixed services and public payphones are required to be made available free of charge. DQ is defined in the USO definition for the standard telephone service and for payphones. Carriers may provide DQ services themselves, or through negotiated commercial arrangement with other providers.

DQ is only funded through the USF for those services that fall in the ACA defined net cost areas.

#### **5.18 Emergency Calls**

Free access to emergency numbers is defined in the USO for the standard telephone service and for payphones. All carriers are obligated to provide emergency call handling, either directly, or by negotiated commercial arrangement with another provider. Carriers are required to meet their own costs of providing emergency call services.

## 6 CANADA

*All financial information in Canadian dollars.*

### 6.1 Basic demographics

GDP: \$1,056 billion (2000)

Population: 30.8 million

Land area: 9,922,000 sq. km

% of population living in urban areas: 77.1% in 2000 (Euromonitor World Marketing Database)

Distribution of income in Canada: 31.5 in 1994 (World Bank 2001)

### 6.2 Industry structure

As with the USA, subscribers in Canada typically have a service provider for local call services and a separate provider for long distance services. This is an important difference from Europe and countries elsewhere, where the majority of customers have one supplier for all these services.

The ILECs have a significant share (>90%) of the local telephony market.

### 6.3 Market statistics

Fixed lines: 20.8 million (2000)

Public payphones: 172,000 (2000)

Mobile subscribers: 10.7 million (end 2001)

Total telecommunications services revenues for Canada: \$31.1 billion (2000)

### 6.4 Indicative prices for telecoms services (ITU 2000) including taxes

business line rental: \$39.95<sup>5</sup> per month (Bell Canada)

residential line rental: \$19.40<sup>1</sup> per month (Bell Canada)

### 6.5 Legal basis for universal service policy

The Telecommunication Act 1993 gives the Canadian Radio-Television and Telecommunications Commission (CRTC) the authority to regulate the telecommunications sector and specifies the universal policy objective as:

*'To render reliable and affordable telecommunication service of high quality, accessible to Canadians in both urban and rural areas in all regions of Canada.'*

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<sup>5</sup> Includes unlimited local calls

<http://www.crtc.gc.ca/eng/LEGAL/TELECOM.HTM>

The CRTC is an independent federal Government authority reporting directly to parliament through the Minister of Canadian Heritage. CRTC policies are based on public participation and its regulatory mandates are carried out through well-established public processes.

The Government policy objectives for the telecommunications sector are to:

- Facilitate the orderly development, throughout Canada, of a telecommunications system that serves to safeguard, enrich and strengthen the social and economic fabric of Canada and its regions
- Render reliable and affordable telecommunications services of high quality accessible in both urban and rural areas in all regions of Canada
- Foster increased reliance on market forces for the provision of telecommunications services, and to ensure that regulation (where required) is efficient and effective
- Stimulate research and development in Canada in the field of telecommunications, and to encourage innovation in the provision of telecommunications services

The most relevant recent orders issued by the CRTC with respect to universal service are:

- **Order 2000-745:** Relates to the introduction of major changes to the Canadian contribution regime to subsidise the high cost of local service and remote areas  
<http://www.crtc.gc.ca/archive/eng/Decisions/2000/DT2000-745.htm>
- **Order 2001-238:** Addresses the introduction of a more consistent and uniform approach to identify high-cost service areas served by the incumbent local exchange companies (ILEC) and a more consistent set of costing methodologies to determine costs associated with the provision of universal service  
<http://www.crtc.gc.ca/archive/ENG/Decisions/2001/DT2001-238.htm>
- **Order 2001-876:** Describes the approach used to revise the contribution percentage used to determine eligible contributions to the fund, based on further revised costing methodologies and new band definitions for high-cost areas  
<http://www.crtc.gc.ca/archive/ENG/Orders/2001/o2001-876.htm>

## 6.6 The scope of universal service

The universal service policy objective is to ensure that universal accessibility is not eroded and that service is affordable in the competitive market place. The CRTC has taken account of Government objectives for the sector and defined the following levels of service, which each Canadian should be able to enjoy:

- Individual local service with touch-tone dialling, provided by a digital switch with capability to connect via low speed data transmission to the Internet at local retail prices
- Enhanced calling features, including access to emergency services, voice message relay service (for the hearing impaired) and privacy protection features
- Access to operator and directory assistance services

- Access to the long-distance network (the capability to make and receive long-distance phone calls)
- A copy of a current local telephone directory

The definition is revised regularly to ensure the latest service developments have been captured. The basic service objective is independent of the technology used to provide the service and may change over time as service expectations evolve.

### **6.7 The universal service obligation (USO)**

In 1998, the CRTC opened up local telecommunications markets to competition and modified the contribution regime. For instance, it decided to make the contribution regime 'portable'. This means that both incumbent and competitive local exchange carriers are entitled to use contribution revenues to subsidise the services it provides in high-cost areas. The subsidy is 'portable', so when ownership of a customer in a high cost area changes hands between an incumbent local exchange carrier (ILEC) and a competitive local exchange carrier (CLEC), the subsidy moves with the customer. Due to the slow emergence of competition in the local markets, most of the contributions are still paid to the ILECs. Bidding for lowest subsidy does not occur.

### **6.8 The cost of the USO**

In Canada, universal service funding is focussed on subsidising the costs of serving high-cost areas. There is no funding of uneconomic customers, payphones or directory enquiries except insofar as high cost areas receive funds, which cover these categories. In this section the following main topics are discussed:

- The costing methodology to determine the costs of serving high-costs areas
- The calculation of subsidy requirements for these high-cost areas

#### **The costing methodology**

Historically, local service costs have been calculated using an embedded costing approach ("Phase III" methodology). This system calculated contribution requirements based on the entire operations of the operator and did not specify specific costs associated with service in high-cost areas. Therefore, the CRTC has introduced a forward-looking cost methodology ("Phase II" methodology) to:

- Deliver the appropriate incentives for efficient provision of service and competitive re-entry in high-cost service areas
- Recognise the link between costs used for the purpose of subsidy calculation and costs used for the purpose of setting tariffs for unbundled local loops (ULL)
- Facilitate cost comparisons for primary exchange residential services across ILECs and other universal service providers

The territories of the major Canadian LECs are subdivided into individual exchange areas and subsequently into bands, based on the costs of providing service in those bands. The overall objective of this banding structure is to de-average the costs of providing services across the territory of the designated operator. Retail prices for local services differ from band to band, but are averaged within a band. Higher retail prices can be charged in high cost areas, but

historically the prices in high cost bands for some operators have been below the prices in low-cost bands.

Over the last four years, the ILECs have been able to move retail prices closer to costs in high cost areas. For some ILECs, retail prices in high-cost areas are now higher than in low-cost areas and for some it is the other way around. This is largely a function of the historic level of retail prices for each ILEC.

During 2001, a consultative process took place to introduce a more uniform approach to identify high-cost areas. The aim of this process was to limit subsidies to high-cost areas only and to ensure that retail prices for local service in less-remote areas should decrease, thus increasing competition in the local markets. The three proposed high-cost bands are:

- Band E: Exchanges with less than or equal to 1,500 local access lines. It was argued that these exchange areas provided insufficient economics of scale to be profitable
- Band F: Exchanges with greater than 1,500 and less than 8,000 total access lines, where the average loop length is greater than 4 kilometres
- Band G: Remote exchanges (e.g. without year-round road access or found in remote parts of a company's serving territory)

The areas that do not attract universal service funding are:

- Band A: Downtown core exchange areas in major cities
- Band B: Remaining exchanges in large major and other large cities
- Band C: Exchanges in small cities (not a precise definition, but roughly 8,000 to 30,000 lines)
- Band D: Exchanges with between 1,500 and 8,000 lines

The CRTC argued that these definitions rely on cost-proxy criteria to establish remoteness, low exchange density and long loops, which had been identified by the ILECs as relevant indicators of high-cost service provision and uniformly apply across ILECs. Various more detailed alternatives were discarded after considering the availability of data across all ILECs and after taking account of the amount of analysis required to establish cost estimates. The Commission noted that the suggested approach had the following advantages:

- It does not require an identification of technology or costs
- It is a banding system with universal definition and uniform criteria across all ILECs
- It is simple to understand, easy to implement and administer
- It has easily identifiable boundaries
- It provides a reasonable degree of cost homogeneity

Overall, this approach would result in an estimated reduction in the number of local access lines eligible for subsidy from 23% to 15% compared with the alternatives suggested by the ILECs. The main points of criticism that remain focus on the lack of detail in the system, which would result in unidentified cross-subsidies in the high cost exchange areas between profitable and high-cost lines, and the use of average loop length as part of the band definitions. The

latter issue results in the elimination of a number of high-cost areas from the equation, because the average loop length is lower than the benchmark proposed.

#### **The subsidy calculation**

For 2002, the following formula applies to determine the subsidy requirement per residence access line:

- The Phase II costs, plus
- The approved mark-up on Phase II costs of 15% for fixed and common costs, minus
- The average annual primary exchange residential service revenue. This includes monthly revenues from basic local telephone services and the revenues relating to all services listed in Section 3.3, minus
- An annual target implicit contribution from optional local services (\$ 60 per line)

The \$60 contribution per line was introduced after it was argued that implicit subsidies should be included in the revenue definition of the subsidy definition. These implicit subsidies include revenues from directories, network services, long distance services and mobile services provided by affiliates and subsidiaries of the ILECs. In the Commission's view, the introduced rate adequately reflected the benefits obtained by ILECs from being the universal service provider in an area. Furthermore, although benefits vary between areas, this provides an incentive to ILECs to generate revenues from these services. Other benefits related to being the universal service provider are not included because these are off-set by the ability of competitive LECs (CLECs) to 'cherry-pick' profitable customers in high-cost areas through local loop unbundling.

The CRTC has not reviewed the return on capital employed (ROCE) for a number of years and continues to use the rate used for the first price cap period that started in 1998 (pre-tax ROCE of 11%). When the ILECs were regulated on a rate of return basis the rates were reviewed much more frequently (every time there was an earnings review) and reset as necessary.

In a further revision of the costing methodologies, the CRTC made a number of adjustments to the forward-looking cost submissions for the year 2002:

- The mark-up for fixed and common costs was reduced from 25% to 15%, predominantly because the Commission had not received adequate justification from the ILECs for the 25% level
- Each ILEC is to modify its Phase II cost component using a pre-determined productivity adjustment, to be determined as part of the current (2002) consultative process on price caps
- Various adjustments were made in a number of operational costs like billing and collection, maintenance expenses and product management and marketing

Together with the move to Phase II cost methodologies these revisions resulted in a reduction of the costs of universal service from 4.5% of eligible revenues in the year 2001 to 1.4% of eligible revenues in the year 2002. See Section 3.6 for the definition of eligible revenues.

The Government monitors penetration of services defined in Section 3.3 to ensure services remain affordable. See Section 3.9 on serving uneconomic customers. During the consultative



process, it was argued that the appropriate revenue component to determine the required contribution should be based on an 'affordable' price for local services rather than the actual retail prices. However, the CRTC argued that, if this affordable price was higher than the actual retail price, this would result in a level of subsidy that would be inadequate to cover the costs of providing service to that area at the prevailing rates.

Just about all the main elements of this system are either contested or under review and the CRTC is expected to provide new guidelines by the end of May 2002. Various elements of this discussion are also part of the review of the price-cap regime, which is expected to be finalised this summer. Telus, the ILEC in Alberta, estimates that on average only 15% to 25% of its own estimation of costs relating to universal service are actually funded. This is largely related to differences of opinion on the band definitions and issues like the mark-up for common costs.

### **6.9 The Universal Service Fund**

The universal service is funded through a 'real' fund, managed at the national level. The fund is essentially a high-cost fund related to the basic services identified in Section 3.3.

All telecommunications service providers, including ILECs, long-distance carriers, CLECs, resellers, mobile operators and service providers international licensees, satellite service providers, Internet service providers, payphone providers, data and private line service providers are deemed to be eligible contributors. There are no discounts, but the following exceptions apply:

- Retail Internet and retail paging service providers are exempt
- Providers of and revenues generated from the sale or rental of terminal equipment
- A minimum eligible revenue base of \$10 million (relating to the previous year) is the threshold to qualify for eligible contributor status. This allows smaller companies to attain a certain level of revenues before being required to contribute and reduces administrative costs relating to the management of the fund

The basis for contributing to the universal service fund has changed significantly since the introduction of the fund:

- Until 1996, contributions were based on the number of interconnecting circuits between LECs and other operators
- From 1996 to 1 January 2001, contributions were based on minutes
- From 1 January 2001, contributions are based on eligible revenues

#### **The initial mechanisms (before 1 January 2001)**

Initially, the contributions were recovered from new competitors on a per-interconnecting circuit (circuits that connect a phone company's network to the new long-distance provider's network). This method was controversial, as some operators were able to carry more minutes per-circuit than assumed in the calculation of the per-circuit rates, which essentially resulted in a discount on their contribution payments. The per-circuit mechanism was replaced with a per-minute mechanism in 1996, and for most non-equal access connection in 1997. A per-minute mechanism has also been applied to international circuits since 1 April 1999.

By the year 2000, the per-minute regime was deemed to be inadequate as the main determining factor for contributions to the fund, for a number of reasons:

- Operators argued that this mechanism limited their pricing flexibility and their ability to market innovative services. For example, the mechanism prevented CLECs from having different local call areas from the ILECs, because contribution is payable on any call that would be a long-distance call for an ILEC
- Service providers might re-route traffic to avoid it qualifying as long-distance traffic and thus limiting their contributions
- The emergence of IP-based traffic increasingly meant that a per-minute charge captured only part of the relevant market for contributions, i.e. the mechanism was no longer technology-neutral
- Long-distance carriers argued that, as long distance carriers were the sole providers of the subsidy, the relative market position of these service providers was negatively affected

#### **The new mechanism from 1 January 2001**

After a consultative process on the issue, the CRTC ordered that the per-minute contribution regime needed to be replaced with a mechanism that was more economically efficient, equitable for all market participants and ratepayers and more transparent to contribution payers.

The CRTC proposed two main alternatives to the per-minute regime; the introduction of a US-style access line charge (ALC) and a revenue-based mechanism. The ALC based system was rejected, as the CRTC believed that shifting the burden from one segment of the market (long-distance) to another (local access) was not in line with its criteria on equability and customer fairness. In addition, future technological developments might render the definition of an access line increasingly difficult and this system would therefore fail to be technology neutral.

The CRTC decided that a revenue-based system would match its criteria on sustainability, competitive equity, economic efficiency, fairness and technological neutrality more closely for the following stated reasons:

- Sustainable, because companies would continue to contribute revenue into the future, even as markets are increasingly competitive
- Competitively fair and equitable because the contribution margin would be spread over a broader range of services and service providers and should not provide an advantage or disadvantage to any new entrant
- Economically efficient, the new system would allow service providers more pricing flexibility because there would be a more direct link between revenues earned and the related contribution obligation
- Fairness to consumers and ratepayers would result from an increased contribution from consumers that make more use of the network
- Technologically neutral, revenues are independent of the underlying technology to provide the service, thus avoiding issues like IP-based traffic and line definitions that would occur in the previous regime and the ALC alternative

The definition of eligible revenues is all retail telecommunications revenues excluding paging, retail Internet and customer premises equipment (CPE) revenues.

The Commission noted that there might be an increased administrative burden in relation to the introduction of a revenue-based regime, but this was considered a minor price to pay for the improvements to the sector as a whole. Specifically, the increased number of contributors, problems around bundled services (some of which might fall outside the revenue-definition) and determining eligible revenues in general would all contribute to an increase in complexity compared with the previous system.

The interim 2002 national subsidy requirement was set at \$279 million as per the following figure.

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FIGURE 6.1 2002 INTERIM SUBSIDY REQUIREMENTS

	<i>(in \$ million)</i>
Administration Costs	2.5
Northwestel	18.7
Small ILECs	34.2
Telebec	18.7
TELUS Quebec	17.3
Large ILECs	187.6
<b>Total subsidy requirement</b>	<b>279.0</b>

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### 6.10 Administration of the USF

In 1998, the CRTC established an independent administrator for the collection of contribution charges from long-distance carriers into a 'real', centrally managed fund. This administrator is the Canadian Portable Contribution Consortium (CPCC).

With the introduction of a revenue-based contribution regime on the 1<sup>st</sup> of January 2001, the Commission introduced a revised administrative system, whereby modifications to the ILEC rate of cost components are to be filed with the Commission on the 31<sup>st</sup> of March of each year. This will allow the Commission to verify the contribution amounts remitted the previous year, review the calculation of contribution eligible revenues, determine which companies will be required to pay contribution and calculate the annual revenue-percentage charge for the new year. All telecommunications service providers above the minimum revenue threshold are required to file monthly reports, in confidence, with the administrator, outlining their monthly contribution payable amount, based upon the previous month's actual revenue and how it was calculated.

The CPCC is funded through the universal fund and these costs are included in the subsidy. The 2001 costs amounted to approximately \$ 2.5 million (see Figure 3.1). The regulator publishes general fund information, but individual filings are confidential.

### **6.11 Serving uneconomic areas**

The mechanism for calculating the subsidy required to serve uneconomic areas is described in Section 3.5.

### **6.12 Serving uneconomic customers**

The CRTC recognises that economic barriers to market entry created by subsidisation should be removed. However, this would result in increased local retail prices in higher-cost areas. This raises the issue of affordability and would result in some subscribers disconnecting themselves from the network.

These concerns resulted in two CRTC proceedings, which looked at the issues of affordability and serving high-cost areas. The CRTC affordability proceeding noted the high percentage of the households with telephone service (98.5%) and concluded that targeted subsidy programme were not required at that time. The affordability issue is monitored on an ongoing basis by means of surveys undertaken by the telephone companies. The CRTC has indicated its intentions to implement a targeted subsidy plan if the monitoring process indicates any affordability problems. At the moment, however, 'rates are affordable in all of Canada' and local service is profitable overall.

There is a service implementation plan (SIP) in place to extend service to remote areas that are currently not served or under-served. Specific estimates on the costs to serve uneconomic customer are not publicly available.

Information on local loops length is filed with the CRTC by the ILECs. This information is confidential. For Telus, the ILEC in Alberta, average loop length is less than 5 kilometres.

### **6.13 Payphones**

Payphones are not part of the universal service definition, although operators are required to justify when a payphone is taken out of service. The Government reserves the right to order the installation of new payphones to ensure last resort access in certain areas. The costs associated with this are borne through the tariffs for local services incorporated in the price-cap. Payphones are competitively provided, but typically only in 'hotspots' like airports, shopping malls and other high traffic areas. Statistics on operations and profitability are not publicly available.

### **6.14 DQ Services**

Directory services are provided by ILECs on a retail and wholesale basis. They are funded through the USF only in high-cost areas designated for funding. Any operator in Canada that becomes a CLEC must provide DQ services, but it is free to provide this service on a contractual basis through a third party. Based on information from Telus, there are no known companies that focus on DQ services on a competitive basis (like in the US), but ILECs do provide DQ services to CLECs on a competitive basis. In general, automated call management systems have been set up to collect information (city and name information) from caller prior to connecting a caller to an operator. Automated systems are also used after the operator has found the number and offers to connect the caller to the desired number (for an additional charge). Statistics on operations and profitability are not publicly available.

### **6.15 Emergency Services**

Emergency services (911) are part of universal service, but the costs associated with this service are paid for through a direct charge to customers (a line-item on their bill of 14 cents per month in 2002). The revenues from this charge are used for two purposes. A portion of the charge is used by the LEC for connection and the rest of the charge is passed on to the municipality or county to fund the call centre that answers the calls. Statistics on operations and profitability are not publicly available.

## 7 CHILE

### 7.1 Basic demographics

Chile has a varied terrain which varies from low coastal mountains in the west, to a fertile central valley region, and to the Andes mountains in the east. Much of the northern part of the country is desert.

Total area: 756,950 square km  
Population: 15,498,930 (July 2002 est.)  
Population density: 20.5 people per square km  
Per capita GDP: \$US 4,609 (2001)

### 7.2 Telecommunications

Telephone density: 23.90 per 100 inhabitants (2001)  
Cellular density: 34.02 per 100 inhabitants (2001)

The growth of fixed line services and access during the early period of operation of the Telecommunications Development Fund is illustrated in Figure 7.1.

FIGURE 7.1: FIXED TELECOMMUNICATIONS SERVICES GROWTH (1988 – 1996)

	1988	1996
Telephone Lines (millions)	0.5	2.2
Lines per 100 inhabitants	4	14
Outstanding applications (years)	7	0.3
Households with telephones (%)	14	53
Population with access to telephones (%)		90

Source: World Bank, 1998

### 7.3 Telecommunications market environment

Chile was the first South American country to fully liberalise its telecoms market. In 1988, the monopoly provider (CTC) was privatised. There are now 11 long-distance operators and eight local phone companies. CTC has 95% of the local market. Santiago has five local operators and in the remaining part of the country, the number of local operators in a particular region ranges from one to three. Approximately 1.5 million inhabitants (10% of the population) live in area without access to a public telephone. The distribution of available services in Chile is highly uneven. This is shown by the fact that Chile has rural teledensity levels of 1%, and Santiago's teledensity level exceeds 25%.

#### 7.4 Universal service - summary

In 1995, Chile began funding universal service access projects through a fund supported by the national budget. Under this program, operators compete to win subsidies for specific licence and concession areas. Although this program has had some beneficial result, it has a number of issues yet to be resolved, including:

- **service delays** – at the beginning of the program, localities waited for two years or more to get access since making their initial request. The main reason for this delay were the financial difficulties encountered by the operators – they did not receive subsidies until equipment was installed, and they had insufficient funds to bear the whole up-front cost of installation. Now, they are requesting some of the subsidy up front
- **selection criteria** – as the regulator's (Subtel's) main criteria for selecting bids has been based on the lowest proposed price, many operators proposed to meet access targets with zero or negligible subsidies. Since the real cost of building networks in rural areas exceeds the maximum subsidy available, the financial viability of some projects is now in question. Since 1999 Subtel evaluates bids based on delivery time, rather than just price
- **unserved areas** – as the competitive bidding process is voluntary, some project areas have gone unserved, as they are not attractive to operators

#### 7.5 Definition and scope of universal service/access

There is no definition of universal service/access in Chile. The *Telecommunications Act 1994* mandates the establishment of a fund to be used to subsidise the cost of providing public payphones in rural and high cost urban areas, but it does not include a service/access definition.

#### 7.6 Regulatory process

The *Telecommunications Act 1994* mandated the creation of a fund to promote and increase the coverage of basic voice telephony to rural and urban areas of low income and teledensity. The government believed that a fund was necessary in order to ensure access to telecoms for people in rural areas. Without assistance, companies would not develop these areas, due to the high costs of infrastructure and the low income of subscribers. The Ministry of Transport and Telecommunications oversees this fund, which is managed on a day-to-day basis by Subtel. There are currently no public processes in place to help develop a universal service/access policy.

#### 7.7 Funding strategy/mechanism

A 1994 Ministerial decree authorised that a fund be established to subsidise projects to increase access to basic voice telephony for four years, beginning in March 1994. From 1996 to 1998, the fund subsidised the installation of 5,362 payphones, with a total subsidy of \$10 million.

##### Selecting concession areas

In 1994/95 Subtel compiled a listing of 2,300 rural localities which required public telephone service, and grouped the localities into projects. Each project was subjected to cost-benefit analysis, and assessed against social and commercial criteria. Projects were determined from

surveys and the recommendations of regions and local communities. This process is available to augment the list of projects in future.

In those cases where the commercial benefits exceeded the costs of provision of service, details were given to local operators to pursue. In such cases no subsidy would be required to support the project.

In other cases, where the social benefits were significant, but commercial viability would be dependent upon subsidy, the projects were listed for bidding on a competitive basis.

Inclusion on the final list for any one year is a voluntary process, and will only occur on the application of the community concerned.

#### **Bidding process**

The first tender was issued in October 1995 and companies were selected in March 1996. Tenders clearly define the terms and conditions for all projects, including:

- the service obligation – number of payphones
- the tariff level (tariffs can be higher for project areas than in urban zones)
- principles of interconnection
- maximum subsidy available.

#### **Selection process**

All operators are entitled to bid for projects. To be eligible, operators must demonstrate that they can:

- provide a public payphone for at least ten years in a given locality
- provide 24-hour service
- be operational from six to 20 months after receiving authorisation.

From 1995 to 1998, Subtel's practice was to select operators that proposed the lowest subsidy. In some cases, operators proposed zero compensation in order to win a particular licence area.

Successful bidders are obligated to provide one payphone for each locality. They can also build private lines in the project area. Each operator has different target dates for installing equipment and providing services, ranging from six to 24 months. Selected operators are granted licences for 30 years. Operators set target dates for the beginning of construction, end of construction and start of service. If operators miss these dates, there are penalties and, in the worse case scenario, operators can lose their licence. Operators receive payment in a fixed sum once they have installed their networks and they have been inspected by Subtel.

### **7.8 Cost of universal service/access**

Subtel technicians make assessments regarding how much it will cost to provide public payphones in a selected project area. In 1996, Subtel only distributed 48% of its budget. This was because 16 (covering 51% of the localities and 59% of the population) of the 46 suggested projects were awarded to operators that requested zero compensation. However, most of the other projects were awarded to operators that requested close to the maximum



subsidy. Also, a number of projects did not receive interest on behalf of operators, thus these localities are still without access.

Operators of payphones under the scheme are free to set tariffs, subject to a fixed maximum rate of \$US 0.07 per minute. A major dilemma is whether the higher prices charged by new entrant operators will constrain traffic growth, considering that the GDP in project areas is generally well below urban areas. Furthermore, there is nothing stopping larger operators, such as the incumbent, CTC, from providing similar services in a project area at significantly lower prices. This may occur if prices are set at or close to the maximum permitted, in larger population centres.

### **7.9 Fund administration**

The Telecommunications Development Fund is administered by a council, headed by the Minister of Telecommunications and financed through the national budget. This council gives the final approval regarding which projects to fund. The day-to-day activities are managed by Subtel's development department. Subtel must make annual requests for project funding as well as for fund administration. The amount needed to administer the fund is around 8% of the total – 600 million pesos (\$US 1.15 million) have been used to administer a fund of over 7.5 billion pesos (\$14 million).

## 8 JAPAN

### 8.1 Basic demographics

GDP: Yen 495,375 billion (2000)

Population: 126.9 million

Land area: 378,000 sq. km

% of population living in urban areas: 78.9% in 2000 (Euromonitor World Marketing database)

Distribution of income in Japan (GINI): 24.9 in 1993 (World Bank 2001)

### 8.2 Industry structure

NTT is the fixed incumbent provider of local, long distance and international telephony services.

NTT's market shares in fixed telephony were:

- local –still close to 100%
- long distance national – 55% (end of 2000)
- international - 17.5%

The three main mobile operators had market shares (at the end of 2001, in terms of numbers of subscribers) of 59% (NTT DoCoMo), 24% (KDDI) and 17% (J-Phone, owned by Vodafone).

CLEC customer focus:

- KDDI offers local, long distance and international fixed services. Japan Telecom offers long distance and international services
- The corporate segment of the market for business services is still dominated by NTT. It competes in this segment with domestic players KDDI and Japan Telecom, and with international players Cable & Wireless, Equant, SingTel and WorldCom.

### 8.3 Market statistics

Fixed lines: 74.3 million (2000)

Public payphones: 715,000 (2000)

Mobile subscribers: 67.1 million (end 2001)

NTT's total Japanese telecoms revenues from fixed services: Yen 6,000 billion (operating revenues for NTT West and NTT East fixed carriers, and NTT Communications Corporation)

Total telecommunications services revenues for Japan: Yen 13,153 billion (2000)

#### 8.4 Prices of USO provider (including tax at 5%)

business line rental:	Yen 2,450 per month
residential line rental:	Yen 1,600 per month
three minute call in peak period:	Yen 8.50
three minute payphone call in peak period:	Yen 30

#### 8.5 Legal Basis of universal service

The *Telecommunication Business Law 1984 (Law No. 86 of 25/12/1984)* provided for the introduction of competition into the Japanese telecommunications market from early 1986, and established the competitive carrier framework.

The *NTT Law, as amended in June 1997*, provides that the purpose of NTT is to hold all the shares of NTT West and NTT East and to ensure proper and stable provision of telecommunications services by these respective subsidiaries.

The NTT Law also provides that the purposes of NTT East and NTT West are to operate regional telecommunications businesses and that NTT, NTT East and NTT West are responsible for providing nation-wide telephone services amongst other things.

Under this increasingly competitive regime NTT Corporation has been facing mounting financial pressure on its traditional universal service-funding base.

On the 15 June 2001 the Japanese Diet passed a number of key amendments to several important telecommunications related laws including the Telecommunications Business Law, NTT Law and other related Laws.

An important change to the Telecommunications Business Law occurred under the heading of '*ensuring the provision of universal service*'. This section outlines measures for establishing a system whereby telecommunications operators bear a portion of the costs in providing such services. Key elements included:

- establishment of a universal service fund
- designation of Eligible Telecommunications Carriers (ETCs) as providers of universal service
- that telecommunications carriers interconnecting to ETCs are required to shoulder reasonable contributions for the provision of universal service
- establishment of a non-profit organisation to collect and administer the universal service fund, under the authorisation of the Minister of Public Management, Home Affairs, Posts and Telecommunications.

The '*New Law*' also incorporated a provision to help ensure that universal service is implemented within one year of these amendments (on 22 June 2002).

However, it appears the above time frame will not be met due to (amongst other factors) the on-going issue of establishing cost models and interconnect rates between the Government of Japan and US Government.

## 8.6 Scope of Universal Service

Universal service is currently embodied by the provision of:

- subscriber telephone services featuring standard pricing and uniform availability throughout Japan
- access to emergency services
- access to and public telephones to ensure a minimum level of service outdoors.

Uniform geographically-averaged rates continue to be charged for network access and local calling. No rate adjustments (which would partially reflect the underlying cost differences between regions) have been introduced.

Policy documents have suggested the scope of universal service could be expanded in the future to incorporate ISDN and mobile telephone services, and potentially limited monthly access to directory services for consumers.

## 8.7 The USO provider

As a publicly owned corporation Nippon Telegraph & Telephone Public Corporation (now referred to as NTT) has delivered universal service based upon uniform geographically-averaged rates for network access and local calling.

Throughout the country the initial cost of subscribing to the telephone network, the basic monthly fee, and the usage fee (message fee) have been at uniform rates.

Effectively, high-cost areas have been cross-subsidised by the access charges from more densely-populated areas, less costly areas, and by long distance charges.

## 8.8 USO cost

The Government and regulatory bodies are concerned to ensure that any final decisions on NTT interconnect cost modelling and rates do not unduly impact NTT's future capacity to profitably invest and compete as a business and to support its own universal service cost component.

## 8.9 The Universal Service Fund

The universal service fund recently established under Telecommunications Business Law, as amended on 15 June 2001 provides for an independently administered fund operating under the direction of the *Minister of Public Management, Home Affairs, Posts and Telecommunications*.

Currently, the NNT Group is the only Carrier identified as an Eligible Telecommunications Carrier, which carries forward from the previous universal service arrangements.

Universal services cost modelling has not yet been finalised although the relevant department has recently published its estimated net costs for universal service.

## 9 KOREA

### 9.1 Basic demographics

GDP: 589,000 bn won (2000)

Population: 47.3m

Land area: 99,000 sq km

% of population living in urban areas: 85.7% (2000 – Euromonitor World Marketing Database)

Distribution of income in Korea (GINI): 31.6 in 1993 (World Bank 2001)

### 9.2 Market structure

Korea Telecom is the fixed service incumbent with dominant market share in both local and long distance markets. Its main fixed services rivals are Hanaro (local service), and Dacom (long distance). There are three mobile operators – SK Telecom (>50%), LG Telecom and KTF.

Fixed incumbents market share in late 2000:

- local services – 98%
- national calls – 86%
- international calls – 48%

CLECS are focussed on:

- high speed Internet access to residential customers in urban areas
- businesses of all sizes in urban areas.

### 9.3 Market statistics

Fixed lines: 21.9m (2000) of which 75% residential

Payphones: 538,000 (2000) of which 27% are public

Mobile subscribers: 26.7 m at 12/00

Total telecoms revenues of KT: 10,500 bn won (2000)

Total telecommunications services revenues in Korea: 29,000 bn won (2000)

### 9.4 Prices

fixed line residential: 5000 won per month (no deposit, urban) reducing to 3000 won per month in rural areas

fixed line business: 5000 won per month (no deposit, urban)

peak 3 minute local call on private line: 39 won

peak 3 minute local call from payphone: 70 won

end user charge for a directory inquiry: 80 won with up to three free inquiries per month

KT charge to other operators for a directory inquiry: 80 won

### 9.5 Legal basis for universal service policy

Universal service is defined in the Telecommunications Business Law (Articles 2 and 3.2) of September 1998. It is specified in more detail in the Telecommunications Enforcement Order of March 1999. The method for estimating its costs and the way it is funded is specified in the Universal Service Directive of June 2000.

The funding of universal service is now under review and the MIC intends to decide on new arrangements during the summer of 2002.

### 9.6 The scope of universal service

Under the various acts, ordinances and directives universal service is defined to include:

- provision of basic local telephone service at an affordable price throughout Korea. This includes service to the off lying islands<sup>6</sup>.
- adequate provision of public payphone service throughout Korea
- free calling from special numbers to the emergency services from all phones – fixed, mobile or payphone
- discounted telephone service for the disabled and those on low incomes
- a mobile telephone service for ships in Korean coastal waters

There are two main possibilities for increasing the scope of universal service:

- the MIC has announced that it intends to roll out ADSL service throughout Korea. There is concern in the industry that the subsidy required to do this might be raised through the universal service fund (USF).
- KT wants to redefine operator DQ services as part of universal service.

### 9.7 The universal service obligation (USO)

KT is the USO provider. It was selected for a two year period in December 1999 and again in March 2002 for a further two years. There are, as yet, no mechanisms to bid for parts of the USO.

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<sup>6</sup> There is no specified requirement for geographically averaged price. Indeed the price of line rental declines in high cost areas. Subscribers who do not make a deposit pay 5200 won per month in urban areas. This falls to 3000 won per month in rural areas

### 9.8 The cost of the USO

Each operator bears its own costs in providing universal service to the disabled and low income groups. So these costs are not estimated. There are 50% discounts on monthly rental and usage charges for fixed telephony and a 30% discount on subscription to mobile services. DQ services are free to these groups.

Emergency calls are carried free of charge by each network operator to a KT gateway to the emergency services call centre. The costs of this call centre are met by the emergency services. So again there are no issues of how to fund this universal service<sup>7</sup>.

The costs of other universal services are estimated as set out below

#### Local telephony

There are significant net costs in serving rural areas with local telephony. These are estimated as follows:

- Korea is divided into 144 areas which are specified by the MIC
- the costs (C) and the revenues (R) for providing local telephony in each area are estimated on a fully distributed historic cost basis. Costs include ROCE at 15.8% pa (nominal pre-tax) as specified by the MIC. Advertising expenditure is excluded but other retail costs of local telephony are included<sup>8</sup>. Revenues include:
  - end user revenues for local calls
  - a call origination charge of 15 wpm for outgoing long distance calls<sup>9</sup>
  - local call termination charges on all inbound calls at 15 wpm
  - fixed to mobile call retention. This is at 50 wpm but will reduce to 20 wpm in May 2002

FIGURE 9.1: THE COST OF THE USO IN KOREA IN 2000

Service	local telephony	payphones	islands telephony	ships mobile telecoms
Revenues (bn won)	6479	438	0?	1.3
Costs (bn won)	6083	605	22	28
Profit (loss) in bn won	416	(167)	(22)	(27)
Areas with cost/revenue ratio:				
<1	12			
1 to 1.1	12	23		

<sup>7</sup> Other than a small transit charge for KT from carrying the call from the gateway to the call centre

<sup>8</sup> KT produces separate regulated accounts for its local telephony and long distance divisions

<sup>9</sup> End user revenue goes to KT's long distance division

1.1 to 1.3				
1.3 to 2	99	62		
2 to 3	21	43		
3 to 4	-	10		
>4	-	6		
total	144	144		
Loss from USO (bn won)	479	201	22	26
US Fund (bn won)	0	40	20	20
Contribution to KT (bn won)	0	26	12	12

- the loss in each area is calculated as  $C - R$ . The distribution of areas by size of loss is shown in Figure 8.1
- KT made a loss of 479 bn won in 2000 in areas where  $C/R$  is greater than 1.1. But overall KT made a profit on local telephony of 416 bn won because the profit in the low cost areas was greater than the loss in low cost areas.

The losses are estimated using a fully allocated cost basis rather than a LRIC basis. So common costs are allocated to the high cost areas. No account is taken of intangible benefits in estimating the costs of universal service.

#### Public payphones

KT operates 148,000 public payphones (2000) on a monopoly basis. There are also 391,000 private payphones that KT rents to owners of bars, restaurants, shops and similar establishments. The loss on these services is estimated as follows:

- costs and revenues are estimated for each of the 144 areas. Costs include equipment purchase, installation and maintenance plus line rental and call conveyance costs. Revenues include:
  - end user revenues from local call charges. Callers paid 50 won per 3 minutes in 2000. This rate is now 70 won.
  - local call termination charges
  - FTM retention of 50 won per month (reduced to 20 won per month from mid 2002)
  - a call origination charge for long distance calls made from payphones
- the distribution of costs to revenues by area is as shown in Figure 8.1
- the losses in areas where  $C/R > 1.3$  was 201 bn won in 2000.

#### Comment

We can see from this description that the estimates of losses do not in any way use the standard principles of net avoided cost as set out in the EU profile. Nor are the benefits of



being the USO provider considered. There is an allowance for embedded inefficiencies. In estimating the universal service costs there is a requirement that costs must exceed revenues by 10% (local telephony) or 30% (payphones) before the losses are counted.

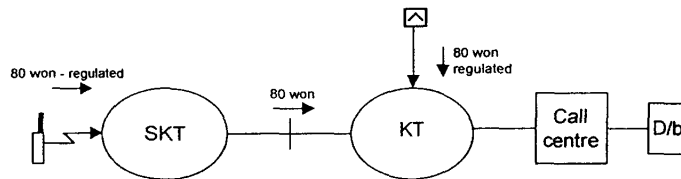
### 9.9 The Universal Service Fund

Korea has operated a USF since 2000. Prior to that KT recovered its local loop losses through access deficit charges added to interconnect charges and other losses through a Telecommunications Administration Deficit fund.

The USF covers most of the costs of universal service but excludes:

- welfare group discounts and emergency calls. Each operator bears its own costs here
- DQ services. DQ is not a universal service. Only KT is required to provide it although the mobile operators also provide it to their customers as shown in Figure 9.2. KT wants to include DQ in universal service and have the losses funded from the USF

FIGURE 9.2: PROVISION OF DQ SERVICE IN KOREA



The current USF is only a small % of the universal service costs estimated by the process of Section 8.5. The reasons are as follows:

- there is no USF for local telephony. Under Article 19 of the US Directive KT, as the US provider, only gets USF if the costs of the service as a whole exceed the revenues. This is not the case for local telephony as Figure 9.1 shows. KT is naturally keen to abandon this rule. If and when the ratio of revenues to costs drops below 100% then the USF for local telephony is estimated as described below for payphones using the relevant parameters from Figure 9.3. Using this process the USF for local telephony would have been 67 bn won in 2000 but for the rule of Article 19.
- the USF for payphones is 20% of the US cost. The MIC has set contribution ratios for payphones (and local telephony) as shown in Figure 9.3. So, for example KT receives 30% compensation from the fund for losses on public payphones and 20% for losses on private payphones in areas where the cost to revenue ratio is between 200 and 300%. There is no theoretical basis for these ratios. They are based on pragmatic judgements by the MIC

- the USF for local telephony for the Islands is set at 90% of losses and the USF for mobile telephony for ships is based on the MIC's judgement on the efficient cost of provision. In 2000 it was set at 76% of losses.

FIGURE 9.3: THE CONTRIBUTION RATIOS USED TO ESTIMATE THE USF

Cost/revenue	<1	1-1.1	1.1-1.3	1.3-2	2-3	3-4	4-5	>5
Contribution ratio now								
local telephony	0%	0%	10%	10%	30%	50%	70%	90%
public payphones	0%	0%	0%	10%	30%	50%	70%	90%
private payphones	0%	0%	0%	20%	20%	20%	20%	20%
KT proposal of 4/02								
local telephony	0%	50%	70%	70%	70%?	70%?	70%?	90%
public payphones	0%	50%	60%	70%	80%	90%	90%	90%
private payphones	0%	0%	0%	20%	20%	20%	20%	20%

Contributions are levied on all licensed carriers (fixed and mobile) with revenues greater than 5 billion won pa. Contributions are calculated in proportion to net revenues<sup>10</sup>. A rough breakdown for 2000 is as follows:

- 10.3 trn won for KT
- 5.8 trn won for SKT
- 3.2 trn won for KTF
- trn won for others (eg Dacom, Hanaro, KGT)

This makes 28 trn won pa in total. So KT contributed 37% of the fund and other operators 63% in 2000 as shown in Figure 8.1.

The USF is collected as a tax on operators rather than a tax on end user spend. This regime replaces an access deficit regime, where KT's local loop losses were funded by a component of the basic interconnect charges.

### 9.10 Administration of the USF

KT estimates the size of its losses by area and KISDI audits the estimates. The MIC then calculates the size of the USF and the contributions.

The fund is a virtual one. The MIC informs the operators how much they should pay KT. Each operator then has a month in which to pay.

<sup>10</sup> End user revenues + interconnect revenues – interconnect payments but excluding VAS revenues

To prevent an excessive time lag between US costs being incurred by KT and other operators paying for these losses the MIC operates a scheme of retrospective adjustments. So:

- the MIC estimates the USF contributions for 2001 using 2000 data
- the other contributors pay KT on this basis. They pay twice – 50% in July 2001 and 50% in January 2002
- when 2001 data is available the MIC re-estimates the contributions due and any adjustments which are required. These payments are then made between the operators.

The costs which the MIC incurs in the USF process are borne out of public funds. The cost of the KISDI audit is paid for by the operators.

The contributing operators receive relatively little information on how their contributions are derived. The MIC informs them of the overall size of the fund and the % contribution which each operator makes to the fund. There is no annual report on the USF.

### 9.11 Providing telephony to uneconomic areas

The 144 areas which are used in the USF calculation were defined by the MIC in advance of the US Directive. KT estimates the losses in each area and the MIC applies the contribution ratios of Figure 8.3 to estimate the USF for local telephony in high cost areas. Section 8.5 provides more details. Only 8% of areas make a loss of less than 10% on this basis. KT does not publish information on what % of lines are in loss making areas.

The Islands telephone service generates further losses for KT in serving high cost areas. But it is funded separately from local telephony service to the rest of Korea. There is general agreement in the industry that this is a genuine US cost. The main components of this cost are the microwave links from the mainland to each island. Given the self contained nature of the cost and the fact that the current system is reaching the end of its economic life there is a good case for auctioning this service to the operator who bids for the lowest subsidy. At the moment however the mobile operators, who would be natural bidders, are not licensed to provide fixed network telecommunications.

The average KT local loop is 2.2 km long. The distribution is as follows:

- 21% < 1 km
- 29% of 1 to 2 km
- 27% of 2 to 3 km
- 14% of 3 to 4 km
- 9% over 4 km

KT does not publish information on the length of local loops in high cost areas.

### 9.12 Serving uneconomic customers

Each fixed and mobile operator is required to offer substantial discounts to disabled and low income groups. This provision almost certainly generates costs in serving uneconomic customers. But these costs are neither estimated nor funded through any USF.

### 9.13 Uneconomic payphones

KT supplies public payphones<sup>11</sup> on a monopoly basis in Korea. There were 148,000 of them at the end of 2000. It also supplies private payphones (391,000 in 2000) to bars restaurants and similar establishments for a rental of 1000 won per month<sup>12</sup> (cf. 5200 won per month for a private line with no deposit). Callers pay 70 won per 3 minutes for local calls on either type of payphone (compared to 39 won per 3 minute for calls from a private line). The price was increased recently from 50 to 70 won.

Payphones use a mix of prepaid cards, credit cards and cash. The mix is not known. The overall loss on payphones services in high cost areas in 2000 was 201 bn won<sup>13</sup>. As people switch to mobile phones, payphone revenues are falling at 20 to 25% pa and this loss is growing. The USF for payphone losses was 40 bn won (public plus private) in 2000. Section 8.5 describes how it was calculated.

### 9.14 DQ service

Only KT is required to provide DQ service to customers. There is a standard charge of 80 won per inquiry (and private line customers get up to three free inquires per month). In practice the mobile operators provide DQ service to their customers as well. Figure 8.2 illustrates. KT handles 300 million minutes of DQ inquires pa (450 inquires at 40 seconds per inquiry). It employs 2806 staff<sup>14</sup> to do this.

DQ makes a substantial loss for KT which estimates the cost recovery charge at 186 won per inquiry. KT is pressing for:

- DQ to be a part of universal service
- its DQ losses to be funded from the USF.

### 9.15 EMERGENCY CALLS

All operators with directly connected customers must provide their users with free access to the emergency services. Each operator bears its own costs in conveying calls to the emergency services centre. The costs of running the centre are met by the emergency services.

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<sup>11</sup> eg phones on the street and in other public places

<sup>12</sup> plus a deposit of around 60,000 won

<sup>13</sup> The split between private and public payphone losses is not known

<sup>14</sup> 2172 contract staff and 634 employees

## 10 UNITED KINGDOM

### 10.1 Basic demographics

GDP: £921 billion (2000)

Population: 59.8 million

Land area: 244,000 sq. km

% of population living in urban areas: 89.5% (2000 – Euromonitor World Marketing Database)

Distribution of income in the UK (GINI): 36.1 (World Bank 2001)

### 10.2 Industry structure

BT is the vertically integrated incumbent operator of fixed services in the UK providing both long distance and local services. Following divestiture of cellular arm it has no interest in mobile networks. BT competes with two main rivals, NTL and Telewest, in the provision of residential services. BT competes with a wide range of operators for business customers including Cable and Wireless and WorldCom.

There are four major mobile operators – Vodafone, Orange (France Telecom), Cellnet (mmO<sub>2</sub>) and One2One (Deutsche Telecom). Hutchinson also has a 3G licence.

BT's fixed network market shares (end 2001) were:

- 32% of the international market
- 62% of the national long distance market
- 83% of the local services market by lines and 73% by local calls

Figure 10.1 table below shows how BT's market share has fallen since 1997.

FIGURE 10.1: BT'S MARKET SHARE 1997 - 2001

Date	% of lines operated by BT	Period – 12 months to	% of calls billed by BT
3/97	89.8%	3/97	89.6%
3/98	86.7%	3/98	85.4%
3/99	86.4%	3/99	81.2%
3/00	83.2%	3/00	77.4%
3/01	83.1%	3/01	73.2%

SOURCE: OFTEL MARKET STATISTICS

CLEC customer focus:

- NTL and Telewest focus on serving residential customers in urban and suburban areas. The pass 65% of UK homes connect to BT's rivals use coaxial cable plus copper loops. Roughly half of these homes can use cable modems.

- BT's rivals in the business market focus on supplying customers in urban areas.

### 10.3 Market statistics

Fixed lines: 35.2 million of which BT provides 28.6 million (mid 2000). BT's network has 5 to 7% Spare capacity in terms of unused local loops.

Payphones: 152,000 of which 97,000 are public payphones

Mobile subscribers: 43.2 million (end 2001)

BT's total UK telecoms revenues from fixed services: £21,200 million (2000)

Total telecommunications services revenues for the UK: £35,000 million (2000)

### 10.4 Prices of USO provider

business line rental: £15.45 per month

residential line rental: £9.99 per month

three minute call in peak period: £0-12 (including VAT at 17.5%)

three minute payphone call in peak period: £0-33 (pro rata and including VAT. The table below provides more detail

end user directory enquiry charge: £0.40 per call (up to 2 enquiries) including VAT and £0.34 excluding VAT

BT charges other operators for DQ: £0.19 per call

### 10.5 Legal Basis

The legal basis for the scope and funding of universal service in the UK is established through European Union directives. The UK regime is compliant with the Revised Voice Telephony Directive (98/10/EC). Oftel claims it is also consistent with the new Universal Service and User Rights directive (2002/22/EC) which comes into force in July 2003.

In implementing these directives Oftel, the UK regulator, has consulted widely and frequently. Figure 10.2 lists the main consultation documents and statements which Oftel has produced over the past seven years. They are available from the Oftel website ([www.oftel.gov.uk](http://www.oftel.gov.uk))

FIGURE 10.2: OFTEL'S CONSULTATION PROCESS ON UNIVERSAL SERVICE

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<i>Date</i>	<i>Milestone</i>
December 1995	Oftel issues consultation document on universal service in the UK
July 1997	Oftel publishes statement at end of consultation period and announces no requirement for USF
July 1999	Oftel launches new consultation process with new document
September 2000	Oftel sets out its findings from the consultation and seeks comments
August 2001	Oftel makes statement setting out arrangements for universal service funding over next four years. Again it concludes no need for USF

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## 10.6 The scope of universal service

The scope of universal service in the UK is determined by EU directives. It requires:

- the universal service providers, BT and Kingston Communications, to offer basic telephone service to all at affordable prices on reasonable request. This means offering:
  - a connection at a geographically averaged price to a fixed network which can support voice telephony and low speed data and fax
  - a package which offers more restricted access to those on low incomes at a lower price
  - reasonable access in all parts of the UK to public call boxes (payphones)
- all operators of fixed and mobile to provide
  - access to the emergency services free of charge
  - itemised billing if required
  - selective call barring
  - access to operator assistance and directory enquiries
- all fixed line operators to offer access to telecommunications facilities for the disabled.

Only the operators with the universal service obligation are required to offer special tariff packages to low income groups.

In reviewing the scope of universal service Oftel noted<sup>15</sup> that mobile services play an important part in ensuring everyone has access to the telephone network. It pointed out that:

- 93% of households rent use of a fixed line telephone. This proportion has remained constant for the past few years
- 6% of the remaining 7% of households use a mobile phone to get telephone access. This % has risen significantly over the past few years
- only 1% of households now do not have access to the network through either a fixed or mobile telephone.

In drawing up its statement on universal service of August 2001 Oftel reviewed the case for extending universal service to include high bandwidth services. It:

- noted the UK Government's objective to make Britain into the leading country within the Group of 7 Industrialised Countries (G7) in terms of broadband access by 2005
- argued that it would be wrong to promote this objective by extending universal service to include broadband access, at least for the time being. Such an extension would:
  - reduce competitive pressure on BT
  - destroy competition between technologies (eg ADSL versus 3G)
  - reduce consumer choice
- concluded that the UK should await the outcome of the European Commission review of the scope of universal service in two years time (see EU profile).

### 10.7 The USO

BT has the main USOs for the bulk of the UK. But Kingston Communications has the equivalent USOs for the city of Hull where, for historic reasons, it is the incumbent operator.

In 1997 BT and Kingston Communication were appointed universal service providers for a four year period. In 1999 the system was changed. BT and KC had their licences changed so that they remained USO providers until such time as Oftel decided to remove the obligation.

There is no auctioning of the USO nor are there any plans to do so.

### 10.8 The cost of the USO

Oftel has estimated the costs and benefits of the USO to BT (and Kingston Communication) on a number of occasions, starting with a study by Analysis in 1995. It has:

- confined estimates of costs to those universal service obligations which fall only on BT (and KC). So it has not considered the cost of directory enquiry service, itemised billing or free emergency calls which fall on all operators

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<sup>15</sup> In its statement of August 2001



- identified the areas, customers and public pay phones which it is uneconomic for BT (and KC) to serve and which it only serves because it has the USO. An area is uneconomic if the costs BT avoids by disconnecting it from its network are greater than the revenues it forgoes
- estimated the avoided costs on a long run basis which includes depreciation charges and financing costs<sup>16</sup> for the capital assets involved in providing the service as well as the operating costs. There are three main categories of costs:
  - the avoidable costs of access
  - the avoidable costs of call transport
  - avoidable overheads. This means that common costs are largely excluded from the net costs of universal service
- used BT's actual costs, from its Financial Results By Service (FRBS) system to estimate USO costs. This means it made no allowance for inefficiencies in BT's operations
- included, in estimating the revenue forgone:
  - all end user revenues generated by the uneconomic area, customer or payphone. This includes revenues from line rentals, local calls, long distance calls, calls to mobiles and calls where the called party pays eg freephone
  - end user revenues generated by other customers calling the uneconomic area, customer or payphone
  - interconnect revenues billed to other operators for transmitting calls to or from the uneconomic area
- adjusted the revenues foregone to avoid double counting e.g. revenues from calls from one uneconomic area to another.

Oftel also estimated the benefits from the USO to BT. It concluded that the following benefits were significant and went on to quantify them:

- **lifecyle effects.** The primary impact here is on the net cost of serving uneconomic customers rather than serving uneconomic areas or payphones. Such customers could, over the next five years, become economic to serve
- **ubiquity.** BT's dominance means that all potential customers know it when choosing their telecommunications supplier. This ubiquity is of substantial value to BT
- **brand enhancement.** The fact that BT is the USO provider gives it the image of a responsible and caring supplier. This in turn influences certain customers to remain loyal to BT or to choose BT as their telecommunications supplier
- **advertising** at payphone sites which are uneconomic to serve.

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<sup>16</sup> At a regulated rate of return of 12.5% per annum

The first column of Figure 10.3 summarises the net costs and benefits which OfTel estimated as a result of its initial cost benefit analysis in 1995. This column of Figure 10.3 shows that, when OfTel first estimated the costs and benefits to BT of the USO, it found that the benefits significantly outweighed the costs. It therefore concluded that there was no need for a universal service fund.

FIGURE 10.3: OFTEL'S ESTIMATES OF THE COSTS AND BENEFITS OF THE USO FOR BT

<i>Costs of US (in £m)</i>	<i>Analysys</i>	<i>OfTel 95/96</i>	<i>OfTel 98/99</i>
Uneconomic areas	9 to 21	5 to 10	5 to 10
Uneconomic customers	49 to 68	30 to 40	38 to 48
Uneconomic payphones	10 to 15	10 to 15	10 to 15
<b>Total</b>	<b>72 to 103</b>	<b>45 to 65</b>	<b>53 to 73</b>
<i>Benefits of US (in £m)</i>			
Life cycle effects	see below	1 to 10	1
Ubiquity	33 to 80	40 to 80	0
Brand enhancement	see above	50	50
Call boxes	14	11	10
<b>Total</b>		<b>102 to 151</b>	<b>61</b>

BT did not agree with these calculations and asked OfTel to look again at its estimates and revised them. After it had done so OfTel reduced significantly the benefits from life cycle effects and agreed with BT that the benefits from ubiquity should be ignored. They arise because BT is dominant in the market and not because it has the USO. OfTel also increased the net cost of uneconomic customers. These changes are shown in the right hand column of Figure 10.3. With these adjustments the costs and benefits of the USO to BT are roughly equal. But, as OfTel points out, the costs take no account of efficiency gains by BT since the original estimates were made. So again OfTel concluded that no universal service fund should be established.

### 10.9 The universal service fund

There is no universal service fund in the UK. But OfTel has consulted on the arrangements which it would use to administer such fund if it were to be required in future. It reached the following conclusions in its consultative document of December 1995:

- an explicit universal service fund is the best way to meet universal service costs if and when they prove an unfair burden on BT. Such a fund distorts competition less than raising charges through increasing interconnect prices. At the same time funding USO costs out of general taxation is unrealistic

- operators who supply fixed and mobile voice telephony services, telex and leased circuits should pay into the fund in proportion to the revenues they generate from these services. Revenues should be calculated net of out payments to other operators. Operators who generate revenues below a threshold (initially estimated at £20 million pa) should not be required to contribute
- minutes or profits should not be used as the basis for assessing contributions. Minutes do not measure market presence and profits are too easy to manipulate so as to avoid contributions to the fund
- a neutral third party, separate from Oftel, should be established to administer the fund. This body would:
  - calculate the size of the fund, the contributions to it and the payments from it using rules established by Oftel
  - publish an annual report giving full detail of payment made to and from the fund and the basis for them.

Oftel has not ruled out the possibility of a USF – especially to fund the light user scheme which is currently used by the most vulnerable 20% of the UK population. Oftel proposes that it will review the way this component of BT's USO is funded in 2003. If the market is then sufficiently competitive it may, in parallel with lifting the remaining retail price controls on BT, set up a USF to subsidise the net cost to BT of its light user scheme.

#### **10.10 Administration of the Universal Service Fund (USF)**

There is no USF in the UK. But Oftel's proposals on how a future fund would be administered are set out in 9.6.

#### **10.11 Uneconomic areas**

Oftel looked at each of the 5,600 local exchange areas in the UK and then made net cost calculations as described in Section 9.5 to estimate if each area was uneconomic. The result of its calculations as shown in Figure 10.4. Two sets of assumptions are used for key parameters where BT was unable to supply data:

**Assumption 1:** traffic per customer line incoming and outgoing is uniform for residential customers

**Assumption 2:** customers in rural areas rely more heavily on the telephone than those in urban areas. So these customers generate 10% more revenues on outgoing calls and 20% more revenues on inbound calls than urban customers. This assumption leads to lower net costs in serving uneconomic areas.

The net annual cost of serving these uneconomic areas, which make up 0.2% to 1.4% of lines in the UK, lies between £9 million and £21 million. This cost falls to £4 million to £9 million per year if we assume that BT uses fixed radio access rather than copper loops to serve these remote customers.

FIGURE 10.4: THE COST OF SERVING UNECONOMIC AREAS IN THE UK

	Assumption 1 (1)	Assumption 2 (1)
Number of BT local exchange areas	5579	5579
Areas uneconomic to serve	761	329
% of areas uneconomic to serve	14%	6%
Land area of uneconomic areas (sq km)	49,000	19,000
% of UK land area	20%	8%
Lines in uneconomic areas	375000	59000
% of BT lines in uneconomic areas	1.4%	0.2%
Net cost to BT of serving uneconomic areas	£21m pa	£9m pa
Net cost to BT of serving uneconomic areas if it used fixed radio access	£9m pa	£4m pa

(1) SEE TEXT FOR DESCRIPTION OF ASSUMPTIONS

There are few, if any, net benefits to offset these net costs directly. But there is the general benefit to BT of enhanced brand value as a result of being the universal service provider in the UK. Part of this benefit arises because BT serves uneconomic rural areas. BT, for example, often uses pictures of rural telecommunications users in its annual report and marketing material.

The average BT local loop is 1.7 kilometres long. The distribution is as follows:

- 19% less than 1 km
- 29% of 1 to 2 km
- 28% of 2 to 3 km
- 14% of 3 to 4 km
- 4% of 4 to 5 km
- 6% over 5 km.

### 10.12 Uneconomic customers

Figure 10.5 provides the basic calculations from which OfTel estimated the net cost to BT of serving uneconomic customers. It shows that around 10% of BT's customers are uneconomic. The vast majority of these are users of BT's Light User Scheme. This scheme is designed to give pensioners and others on low income cheap access as long as they make few outbound calls. So for example a customer who make no calls pays a line rental of £4.70 per month rather than the standard price of £9.99 per month. In 2000 there were nearly 2.8 million

customers<sup>17</sup> who used this scheme at a cost to BT of just under £40 million per year.

FIGURE 10.5: ESTIMATING THE COSTS OF SERVING UNECONOMIC CUSTOMERS

	Assumption 1 (1)	Assumption 2 (1)
Number of BT customers	22m	22m
Number of uneconomic customers	2.2m	1.9m
% of customers uneconomic	10%	9%
Net cost to BT of serving uneconomic customers	£68m pa	£49m pa

(1) SEE TEXT FOR DESCRIPTION OF ASSUMPTIONS

### 10.13 Uneconomic payphones

There are around 155,000 payphones in the UK. This total is made up as follows:

- 94,000 public payphones provided by BT
- 3,000 public payphone provided by other operators
- 58,000 private (or managed) payphones of which BT supplies 46,000

The bulk of BT's public payphones use prepaid cards and an increasing % offer a choice of payment methods which includes cash, prepaid cards and credit cards. We are not able to get information on the average life of a BT public payphone.

Historically BT has made a small profit on its public payphone operations as Figure 10.6 illustrates. But BT expects to make a loss in future. Revenues from public and private payphones are declining sharply (at around 15 to 20% per annum over the last three years) and there are limits to how much BT can reduce its operating costs on this business. It is worth noting that BT's capital employed on its payphone operation is negative. This reflects the fact the bulk of BT's payphones use pre-paid cards.

FIGURE 10.6: BT'S FINANCIAL RESULTS FOR PAYPHONES

	2000/01 in £m	1999/00 in £m
Revenues from public payphones	220	272
Operating costs of payphone business	(68)	(80)
Transfer payments to Network division for calls and access	(129)	(159)
Profit	23	33
Fixed assets eg payphone equipment and sites	16	24

<sup>17</sup> This compares with the 2.2 million customers in 1996 when the estimates of Figure 5 were derived

Debtors	19	22
Creditors	(58)	(72)
Mean capital employed in the business	(23)	(26)

SOURCE: BT'S REGULATED ACCOUNTS FOR 2000/01

Using data from 1995/96 Oftel estimated that 25,000 out of the (then) 122,000 payphones operated by BT were uneconomic. These were virtually all cash based rather than pre-paid phones. The net cost of providing these uneconomic payphones was estimated at £14 million per annum using an avoided cost and revenues forgone approach. These net costs were largely offset by potential advertising revenues estimated at £6 million to £12 million per year.

#### 10.14 Directory enquires (DQ)

Directory enquires (DQ) is a universal service which all operators in the UK must provide to their directly connected customers. The big operators like BT, Vodafone and Cable & Wireless run their own DQ services using database information supplied to them at cost based prices by BT. Other small operators buy in their DQ service. For example BT supplies this service on a wholesale basis at a price of 28 US cents per call. There are at least four DQ service providers in the UK. This includes Conduit, a specialist DQ service provider which operators in at least four EU countries. Most DQ service providers use a mix of human operator (to answer the caller's initial enquiry) and automated voice synthesis (to deliver the number the number when found). The number of staff working in the UK DQ industry is not known. But we do know that:

- BT handles 650 million DQ calls each year
- 500 million of these calls are from BT's own customers and 150 million are wholesale calls i.e. generated by customers of other operators who purchase BT's DQ service on a wholesale basis
- each call takes 27 seconds on average to complete

BT stopped reporting on directory enquiries in its regulated accounts in 2000. But, as Figure 10.7 shows, up to April 1999 BT gradually transformed its DQ operation from an unprofitable service to one making a significant profit.

FIGURE 10.7: FINANCIAL RESULTS FOR BT'S DIRECTORY INQUIRY SERVICE

Item	1995/6	1996/7	1997/8	1998/9
Revenues from DQ (£m)	110	115	124	155
Operating costs (£m)	143	140	137	127
Profit (loss)	(33)	(25)	(13)	28

SOURCE: BT'S REGULATED ACCOUNTS

BT's DQ service does not receive universal service funding. Nor would it if Oftel chose to establish a universal fund in the UK.

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## APEC TEL Interconnection Workshop

### 1.1: What is interconnection and why is it important

Jim Holmes

[www.ovum.com](http://www.ovum.com)

**ovum**

## Contents

- Definition
- Interconnection in a multi-operator environment
- Importance of interconnection
- Fair and reasonable conditions

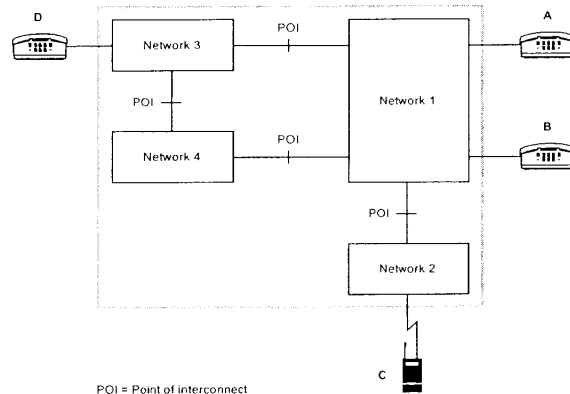
2

## Definition

- Interconnection between networks involves arrangements that permit users whose terminals are connected to one network:
  - to call and be called by users whose terminals are connected to another
  - to access services provided on other networks
  - to select carriers for their calls
- The networks involved may be any combination of fixed or mobile networks and any combination of circuit-switched and IP based networks.

3

## Interconnection in a multi-operator environment



4



## Importance of interconnection

- A competitive network environment is unsustainable without interconnection
- Without interconnection entrants would be unable to attract customers
- Any-to-any connectivity
- Major supplier mandated interconnectivity

5

## Fair and reasonable conditions

- Conditions relating to what - more than price?
- What are fair and reasonable conditions?
- What is a fair and reasonable interconnection charge?
- Economic costs and compensation are the key
- What is an economic cost?

6

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## APEC TEL Interconnection Workshop

### 1.2: WTO Basic Services Agreement

Jim Holmes

[www.ovum.com](http://www.ovum.com)

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## Contents

- Background to the Reference Paper
- Coverage of the Agreement
- Interconnection
- APEC Member Economies

2

## Background to the Reference Paper

- GATT Uruguay round 1987-1994
  - *resulted in WTO*
  - *resulted in GATS*
- GATS Reference Paper - included telecommunications
- Agreement in February 1997

3

## Coverage of the Agreement

- Concerned with basic Services, but provision for VAS
- Competitive safeguards - especially relating to cross subsidisation and misuse/withholding of information
- Interconnection on non-discriminatory terms, conditions and rates
- Universal service policies to be competitively neutral and not more burdensome than necessary
- public availability of licensing criteria
- independent regulation
- fair procedures for allocating scarce resources

4

## Interconnection - 1

- Applicable to major suppliers
- Non-discriminatory terms, conditions and rates
- Interconnection quality no less favourable than provided to own like services
- At technically feasible points
- At cost-oriented rates that are transparent and feasible (having regard to economic feasibility)
- Unbundled
- Available at additional network points on request
- Publicly available interconnection procedures
- Transparency of agreements or reference offers
- Dispute settlement mechanisms - via independent body

5

## Interconnection - 2

- Major supplier
  - *Has significant market power*
  - *Possible this results from control over essential facilities*
  - *What is market power?*
  - *What are essential facilities?*
  - *Can be applied to other or all suppliers*
- What are basic services?
- What are technically feasible points?
- What are cost-oriented rates?
- Dispute settlement

6

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## APEC TEL Interconnection Workshop

### 1.3: APEC Interconnection Principles and Framework

Jim Holmes

[www.ovum.com](http://www.ovum.com)

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## Contents

- Cancun Declaration
- Relationship to WTO Agreement
- Additional details to Principles
- APEC Framework for Interconnection

2

## Cancun Declaration

- Substantial work by APEC TEL
- APEC meeting of Ministers responsible for telecommunications and information industry (TELMIN 4) met in Cancun, Mexico in May 2000 and adopted Declaration
- Declaration deals with APEC Principles for Interconnection
- 8 principles enunciated

3

## Relationship to WTO Agreement

- APEC Principles are voluntary; accession to WTO Agreement is a binding international treaty obligation
- APEC Principles therefore must be consistent with WTO Agreement undertakings - "not meant to replace or exceed commitments made by APEC WTO member economies under the Agreement..."

4

## Additional details to Principles

- No additional commitments, just voluntary detail
- Indications of expected timeframes for implementation of each Principle
- Costing methodologies etc to be enabled through broad consultation with interested parties (Principle 5.2)
- Encouragements to parties to negotiate in a timely manner and in good faith.

## APEC Framework for Interconnection

- Of real explanatory value
- Examples are very useful
- Note that Framework dates from 1999 - therefore some examples may be out of date or the circumstances changed

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## APEC TEL Interconnection Workshop

### 1.4: Key Interconnection Policy Issues

Jim Holmes

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## Contents

- The issue slate
- Obligation to provide call termination interconnection services
- Obligation to provide call origination interconnection services
- Which charges should be regulated
- Payment for changes and upgrades to incumbent's network
- Entitlement to receive interconnection services
- Regulator determined outcomes and negotiated outcomes
- Technically feasible points of interconnection

2



## The issue slate

- Document 1.4 / 1 covers a selection of key interconnection policy issues - others will arise in the course of the Workshop
- These issues are not necessarily resolved by reference to the WTO Agreement or APEC Principles
- Need to have a clear view of the policy goals and framework for issue resolution
  - *effective and sustainable network services competition on the merits of service offerings as determined by the market*
  - *fair and reasonable compensation and other interconnection conditions*

3

## Obligation to provide call termination interconnection services

- Major suppliers
- Control over essential facilities
- Relationship between general market power and access to directly connected customers
- What to do with non-dominant operators - should they be obliged to provide terminating interconnection services?
- Various approaches

4

## Obligation to provide call origination interconnection services

- Carrier selection services
- Who owns the customer? Who should bill?
- Major suppliers
- Comparisons with terminating interconnection services:
  - *More and earlier competition in this market*
  - *Customer power clearer here*

5

## Which charges should be regulated

- Practices differ
- WTO and APEC principles directed at major suppliers, as defined
- Ovum's view re charges -
  - *all termination interconnection services should be regulated*
  - *origination interconnection services by operators with significant market power should be regulated*

6

## Regulation of non-dominant operator interconnection charges

- **Issue:** If non-dominant operators are to have their terminating interconnection rates regulated, there is the further question of the standard to which they should be regulated ?
- Own costs
  - *advantages*
  - *disadvantages*
- Incumbent or dominant supplier costs - not a cost-based approach as normally understood
- Reciprocal charges - to avoid large differences in the termination of different networks

7

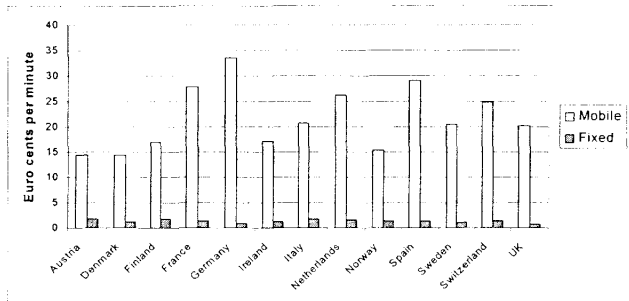
## The special case of fixed to mobile interconnection - 1

- Concerned here with CPP mobile markets
- **Issue:** Should these rates be regulated? What if the mobile operator has a low market share?
- Whose interests are at stake here? Does the mobile customer care?

8

### The special case of fixed to mobile interconnection - 2

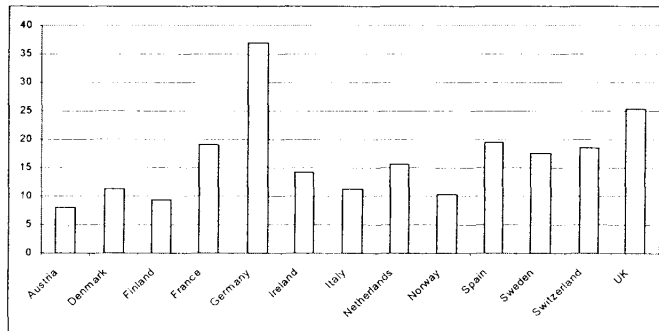
COMPARISON OF AVERAGE MOBILE AND FIXED TERMINATING INTERCONNECTION RATES IN EUROPE



Source: Ovum Interconnect (Jan 2000)

### The special case of fixed to mobile interconnection - 3

RATIOS OF MOBILE TERMINATION TO FIXED TERMINATION CHARGES



Source: Ovum Interconnect (Jan 2000)

## Payment for changes and upgrades to incumbent's network

- Site upgrade (co-location)
- System modification
  - *once only if operator specific*
  - *in per minute charges if part of on-going joint and common costs*

11

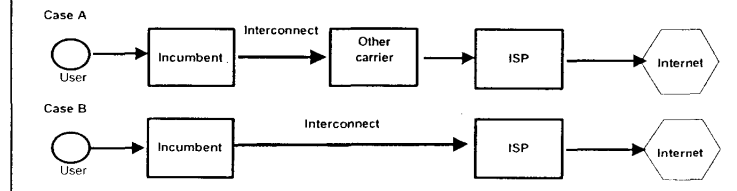
## Entitlement to receive interconnection services - 1

- Wholesale services designed for wholesale customers
- Licensing categories may determine entitlements
- The broader the categorisation the wider the entitlement
- Non-infrastructure based service providers - such as ASPs and ISPs
- Originating or terminating service? (*next slide*)

12

## Entitlement to receive interconnection services - 2

### ACCESSING SERVICES ON OTHER NETWORKS



13

## Regulator determined outcomes and negotiated outcomes - 1

### • Regulator

- Certainty
- Transparent, published
- Reduce power imbalances and information asymmetry
- takes account of all interests
- participatory

### but

- time consuming
- appeals and other delays
- taxing on limited regulatory resources
- may infringe commercial confidentiality

### • Negotiated

- WTO and APEC preference
- Meets commercial needs and reflects commercial trade-offs
- Low cost
- Preserves commercial confidentiality

### but

- Power imbalance
- Gaming and bad faith
- Public interest may be overlooked
- Not transparent - no guidance to others

14

## Regulator determined outcomes and negotiated outcomes - 2

- Some matters are more suited to negotiated or regulator-determined outcomes than others
- Regulator-determined (Ovum view)
  - *call termination rates and interconnection levels*
  - *call origination rates for carrier selection and interconnection levels*
  - *maximum provisioning times*
  - *sharing of international incoming traffic*
  - *what infrastructure should be shared*
  - *publication of information (service performance measures, etc)*
  - *allocation of numbers and codes*

15

## Technically feasible points of interconnection - levels in hierarchy

- Not just a technical matter - has policy significance
- Determines whether the incumbent's switching structure will determine the way in which competition is allowed to emerge.
- Consequences of insisting that all interconnection will take place at local switch level
- Consequences of insisting that all interconnection will take place in a few centralised locations, nationally

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## APEC TEL Interconnection Workshop

### 1.5 Regulatory Frameworks

John Horrocks

[www.ovum.com](http://www.ovum.com)

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## Contents

- Roles and powers of regulators
- Making it all work

2



## Framework

- Adequate legal base essential, essential, essential
- Governments make policy and law
- Regulators fill in details under the law (Very important)
- Regulators “police” the law
- Regulators have some enforcement powers
- Courts have ultimate enforcement powers

3

## Comment

- Most law is about stopping “wrong” practices
- Interconnection is about making the incumbent do what it does not want to do - much more difficult
- Normal legal processes are too slow and inexpert
- Regulators are the “fast reaction force”
- Regulation of interconnection has profound impact on the market
  - *Incumbent has most of the business*
  - *New entrants copy incumbent l/c rates*
  - *Difference between retail and interconnection charges is the market scope for new entrants*

4

## Regulator's powers - 1

- Determine interconnection charges and conditions
  - *Most incumbent charges are determined or approved*
- Determine technical and operational arrangements
  - *Points where interconnection is offered*
  - *Delivery timescales for establishing interconnection and increasing capacity*
  - *Numbering including carrier selection codes*

5

## Regulator's powers - 2

- Determine criteria for resolving issues
  - *Advance notice may help negotiation*
- Determine disputes
  - *Hearings*
  - *Production of documents*
  - *Answering questions*
  - *Prevent gaming*
  - *Issue directions*
- Enforce licences and directions (details in later presentation)

6

## Contents

- Roles and powers of regulators
- **Making it all work**

7

## Related areas

- Numbering
  - *Blocks for customers*
  - *Carrier selection codes*
  - *Number portability codes*
  - *Signalling point codes*
- Number portability
- Infrastructure sharing
  - *Ducts*
  - *Masts*
  - *Poles*

8

## Common problems

- Incumbent refuses to do the obvious - may be a problem of the staff understanding the regulations
- Poor forecasting and ordering
- Lack of information about the incumbent's network
- Introduction of new services
- Access to the incumbent's premises
- Problems of points of contact and problem ownership
- Internal politics within the incumbent

9

## Regulator's expertise

- Legal
- Commercial and economic
- Technical
- Operational
  
- Needs to recruit people with technical and operational expertise but be cautious that they have an incumbent's mindset
  
- Need to develop details cost model of incumbent

10

## Hints

- Private regular informal discussions with new entrants
- Attend negotiations as silent observer
- Establish round table discussions between interested groups
  
- Separate technical and commercial
- Promote a culture that solving the customer's problems comes first
  
- Agree to start operations in advance of determining details of charges

11

## Technical documentation and procedures

- Transmission planning
- National profiles of standards for interconnection
- Privacy (eg CLI)
- Schedules for upgrading signalling versions
- Procedures for carrier selection, number portability, local loop unbundling
  
- National committee structure
- Regulator should attend to learn and moderate

12

## Problem solving

- Consultation is quite different from problem solving, need a different approach
- Consult on objective, problem solve, consult on result
- Use small invited group for problems solving
  - *Expertise on issue*
  - *Ideas people*
  - *Methodical analysis*
  - *Clear writing up*
- Motivate people as informal "special advisers"
- Regulator must incubate problems solving

13

## Quality of service and statistics

- Publish market traffic statistics for incumbent and aggregated for other operators
- Require publication of QoS statistics for both customers and interconnections (ETSI has done original work on parameters for key issues)

14

## Getting information

- Three roles of communications
  - *To convey information*
  - *To hide information*
  - *To hide the absence of information*
- Get to the right people and re-use the ones who know and understand clearly
- Operators may not know how their network works
- Operators depend strongly on suppliers, more so as competition develops
- Incumbent's biggest problems are:
  - *Corporate culture attuned to monopoly conditions*
  - *Huge over-manning - reduces total output as organisations become political. Factors may be as high as x10 in management*

## ovum DEFINING THE FUTURE

### APEC TEL Interconnection Workshop 1.5: Regulatory Frameworks

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## APEC TEL Interconnection Workshop

### 1.6/1: Networks - Fixed

John Horrocks

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## Contents

- Interconnection services
- Levels of interconnection
- Physical arrangements
- Numbering
- Ordering
- Testing

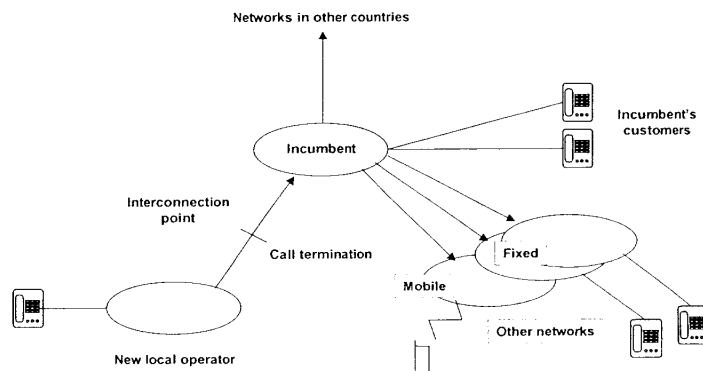
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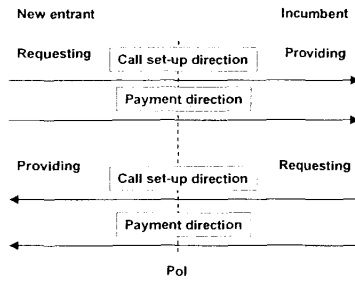
## Categories of interconnection service

- Call termination to provide an any-to-any capability
- Call origination to support carrier selection
- Local loop unbundling
- Support services
- Leased lines

## Call termination

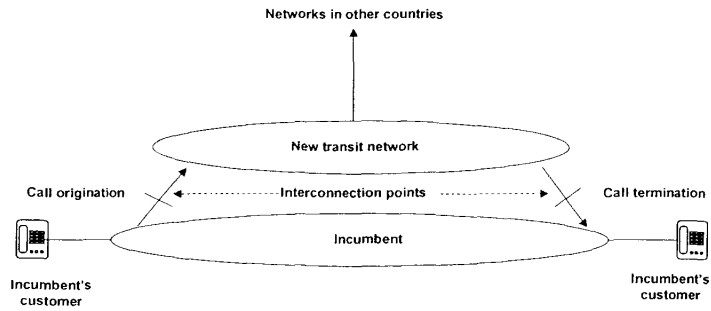


### Termination - Flows

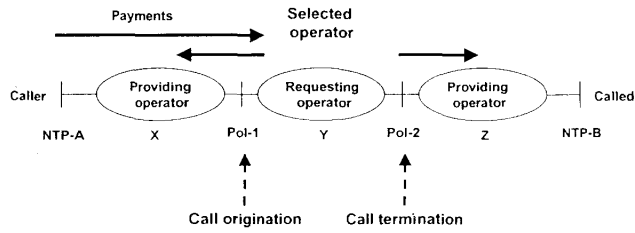


Balance depends on traffic sinks, eg call centres and ISPs

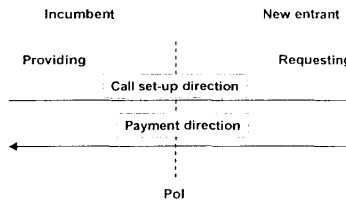
### Call origination



### Call origination - Payments

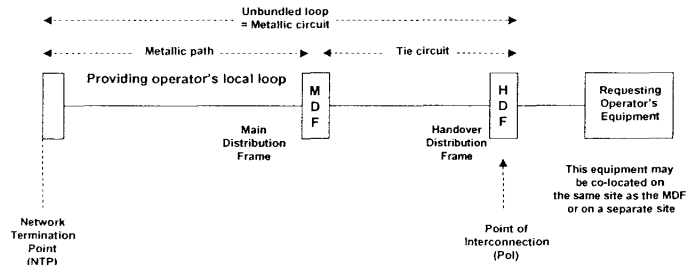


### Origination - Flows



Normally totally unbalanced as only provided by incumbent and dominant operators

## Local loop unbundling

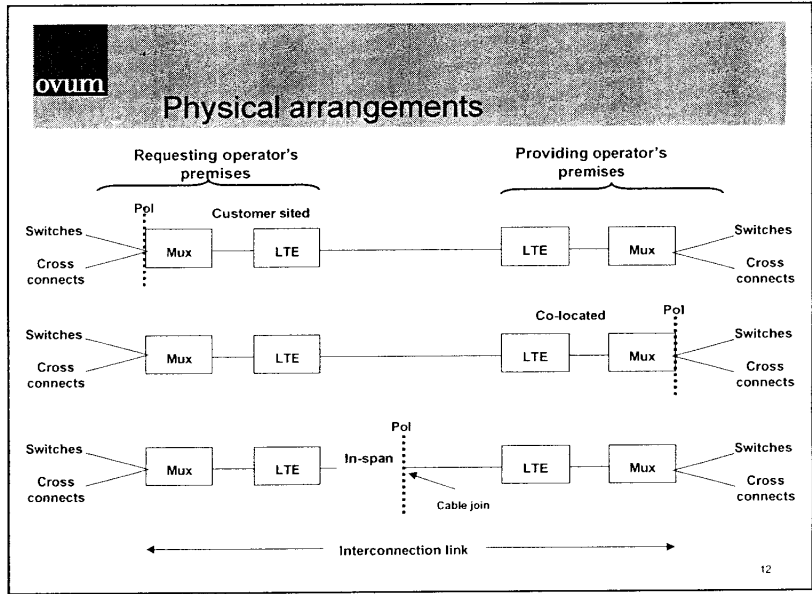
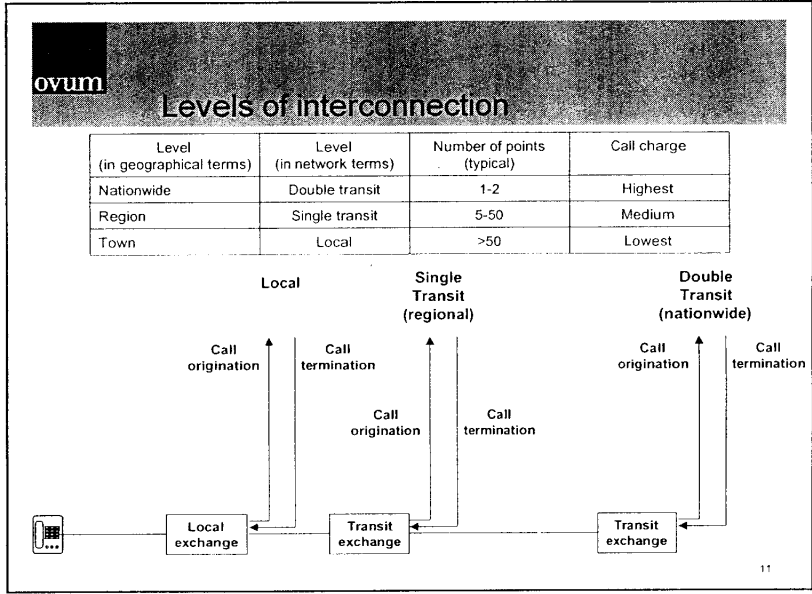


## Support services

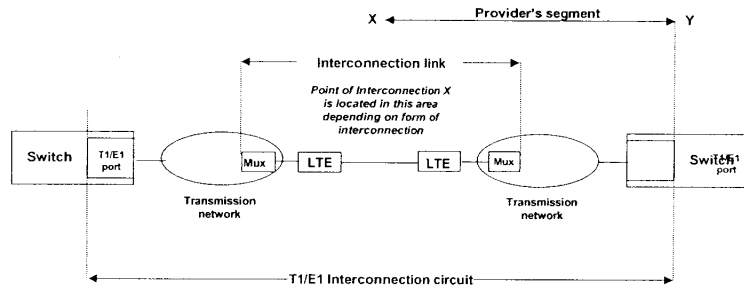
- Call termination for operator assisted calls
- Access to emergency service centres
- Access to directory enquiries
- Interconnection of operators and maintenance staff for fault resolution

### Leased lines

- Parts that the new entrants cannot offer



## Links and circuits



### Circuit types

- Call origination from a specific switch
- Call termination to a specific switch in one direction
- Call termination to a specific switch in the other direction
- Leased lines

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## Numbering

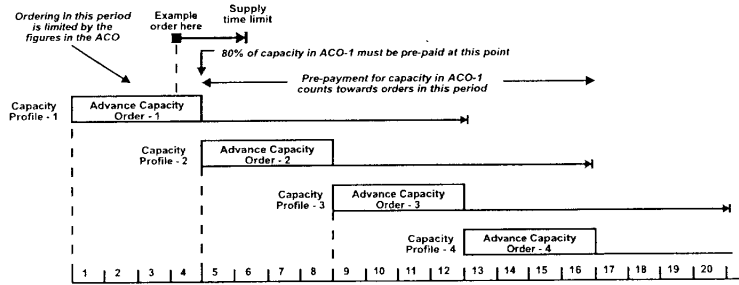
- Number blocks for customers
- Number portability and routing codes
- Signalling point codes
- Carrier selection codes

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## Ordering cycles

- Ordering specific types circuits within the capacity of the link
- Systems vary but common elements are:
  - *Ordering based on 3-6 monthly cycles*
  - *Advance order/commitment*
  - *Fast delivery up to 10-20% over advanced order*
  - *Penalty for unused capacity*

## BT ordering cycle



## Testing

- Compatibility of signalling (new switch and software combinations only)
- Data fills (all switches and combinations of destination)
- Commissioning (support systems eg billing)

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APEC TEL Interconnection  
Workshop  
1.6/2,3,4,5: Networks - Other  
Internet access  
Non-geographic  
Mobile & New services

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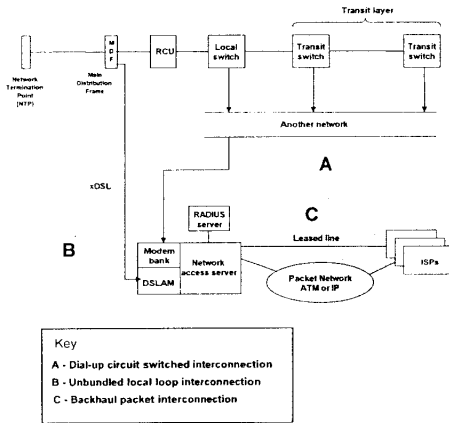
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## Contents

- Internet access
- Non-geographic (number translation)
- Mobile
- New services

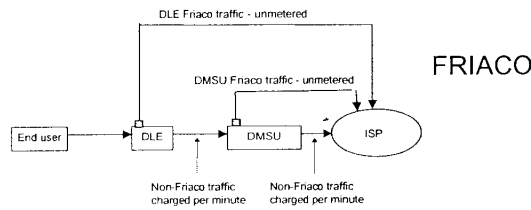
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## Internet access

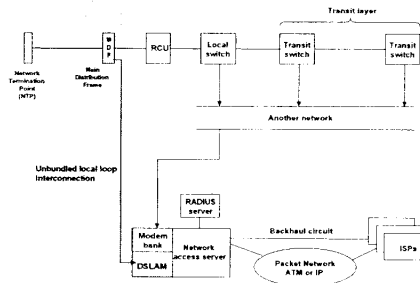


## Dial-up interconnection charging

- Many options
- Normal call termination
- Call to non-geographic number with special origination rate
- Flat rate local or transit (Flat Rate Internet Access Call Origination)

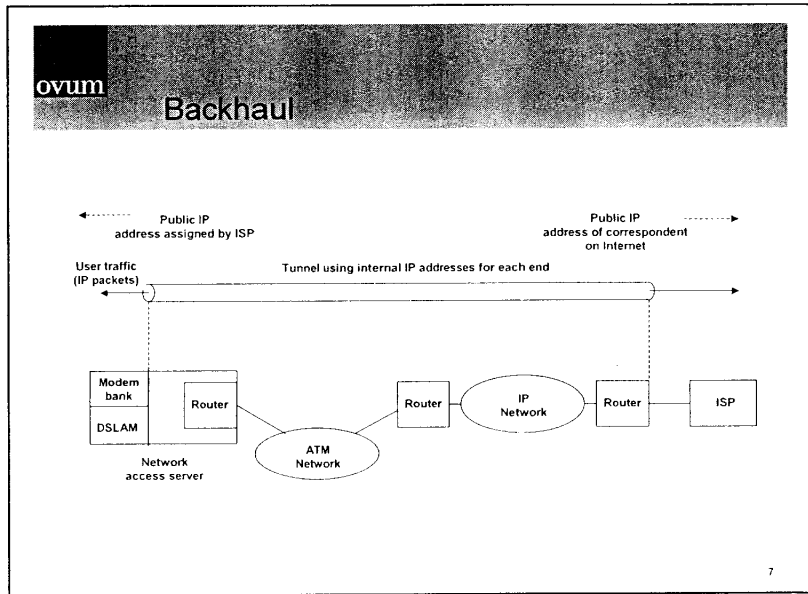


## Unbundled loop



## Unbundled loop forms

- Physical - ISP or other operator runs the NAS
- Bit stream - incumbent runs the NAS and may also provide backhaul



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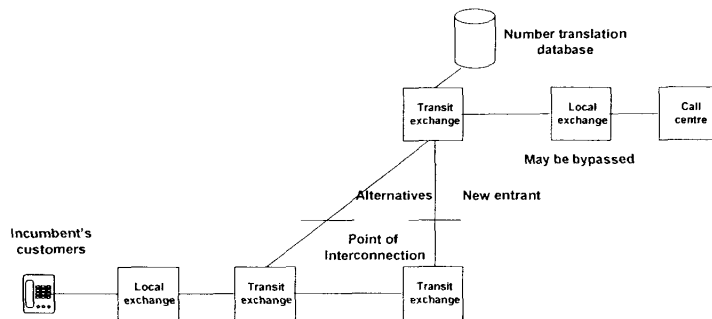
- Internet access
  - Non-geographic (number translation)
- Mobile
- New services

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## Non - geographical = Number translation

- Freephone
- Local rate, national rate including some Internet access
- Premium rate

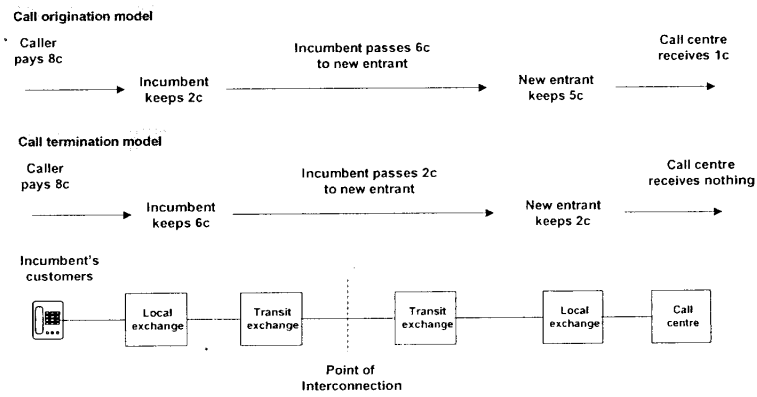
## Non - geographical



## Non - geographical charging

- Cost based call origination plus ???, or call termination
- OfTel allows mark up/uplift for some retail costs
  - Finance and billing costs
  - Customer service
  - Marketing – aimed at getting more people connected to BT in the UK
  - Marketing – aimed at non-UK customers
  - Marketing – aimed at increasing call revenue
  - Billing enquiries
  - Fault report
  - Complaints
  - Indirect retail costs

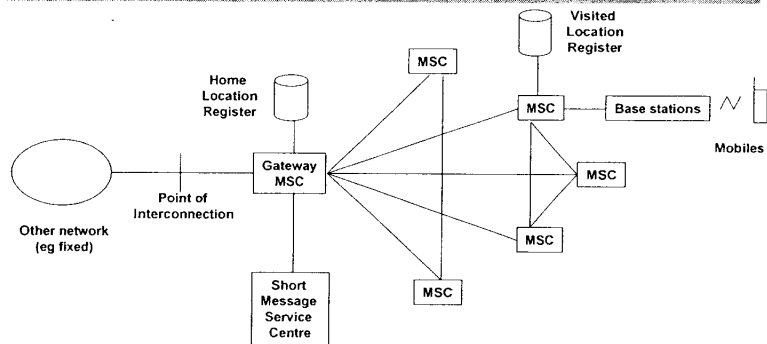
## Non - geographical charging example



# Contents

- Internet access
- Non-geographic (number translation)
- Mobile
- New services

# Mobile



## Mobile interconnection

- Mobiles are mostly interconnected via fixed
- Interconnection to fixed same technically as fixed - fixed (call termination)
- Some countries have introduced carrier selection from mobile in last 2-3 years but it is rare
- Fixed to mobile has problem of high call termination rates
- Also need support of Short Message Service through interconnecting the signalling of the mobile networks

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## Contents

- Internet access
- Non-geographic (number translation)
- Mobile
- New services

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## New services - scenario

- Incumbent wants to introduce new service or technical feature
- Customer interface and interconnection interface need changing technically
- Service needs customer trials
- Incumbent wants service to be available only to and between its own customers to disadvantage the other operators

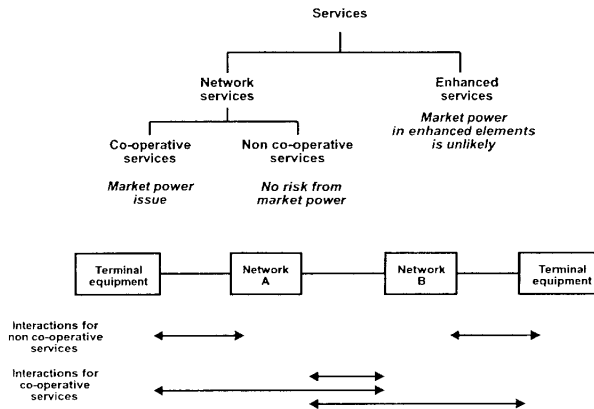
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## New services - Issues

- Support of feature at interconnection point
- Advance publication of information for other operators
- Choice of customer interface (Network Termination Point)
- Participation in trials

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## OfTel approach



## New services - OfTel requirements

- Consult other operators 21 months before launch about technical design of interfaces (both interconnection and customer)
- OfTel can issue directions interface if no consensus
- Publish interfaces 15 months before launch
- All operators have right to participate in trials
- Offer interconnection at same time that service starts

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## APEC TEL Interconnection Workshop

### 2.1: Charge and cost models

Craig Skinner

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## Contents

- Charging options
- Costing standards
- Cost data
- Cost models
- Interconnection pricing

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## Charging options

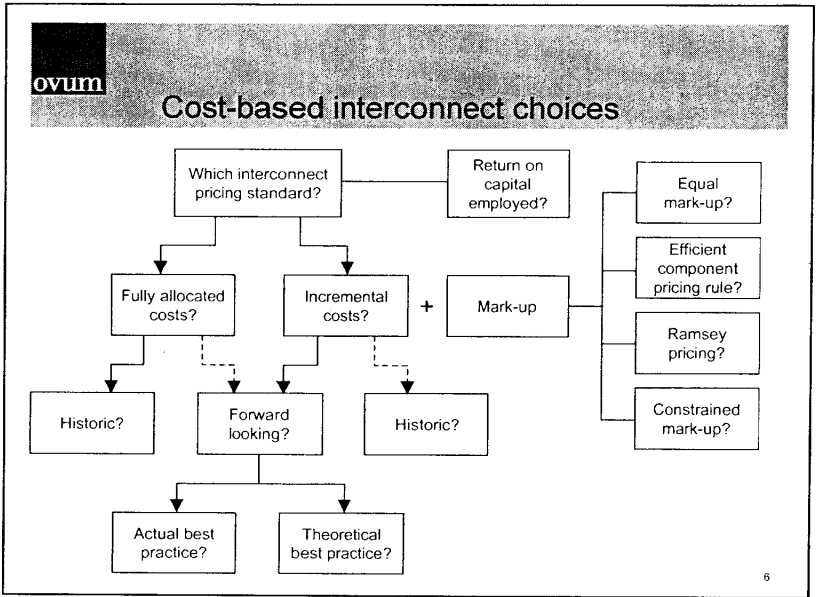
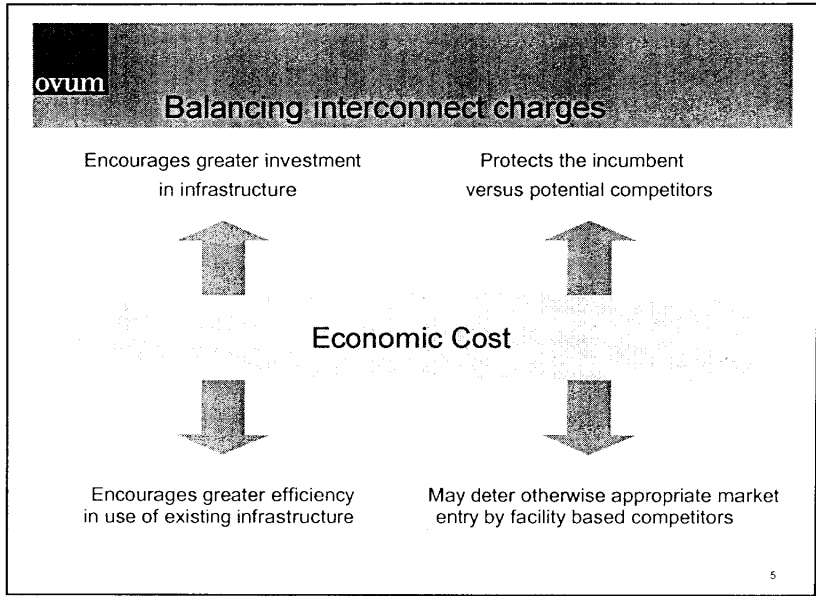
- Price sharing
- Revenue sharing
- Bill and keep: appropriate when
  - *interconnect traffic is balanced*
  - *or each carrier is able to charge for the costs they incur*
- Cost-based
  - *WTO and APEC refer to interconnect services of major suppliers being cost-based*
  - *intent is to deliver similar outcomes to full competition*

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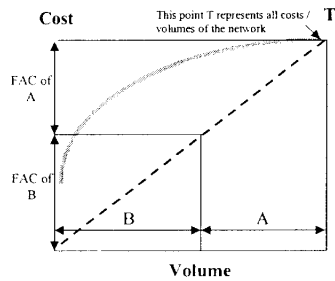
## Cost based approach

- Aim is to encourage economically efficient investment to promote the long term interests of end users
- Balance between
  - *efficient use of existing infrastructure*
  - *investment in new infrastructure by incumbents and new entrants*
- Regulation of interconnect services is required where there is potential market failure
- Without infrastructure based competition - ongoing regulation will be necessary

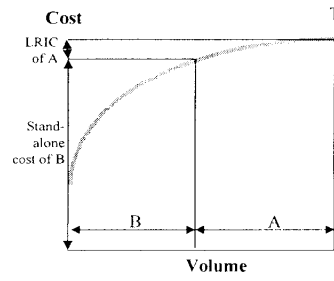
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## Cost standards



**Fully Allocated Costs**



**Long Run Incremental Costs**

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## Fully Allocated Costs (FAC)

- Total network costs are allocated to the network services
- Cost allocation is spread across all services
- Each service is costed at an average level
- Typically used in a top-down model with historic or current costs

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## Long Run Incremental Costs (LRIC)

- Estimates the incremental cost of providing the service under consideration
- Defined as the total cost when the service is provided less the cost when the service is not provided
- By measuring over the long run, infrastructure investment is variable rather than fixed and can be matched to capacity
- If common costs are to be recovered, then a mark-up is required
- LRIC can be used with top down or bottom up models and typically uses current or forward looking costs

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## Cost data

- Historic costs
  - *actual costs incurred*
- Current costs
  - *revalue assets at their replacement costs*
- Forward looking costs
  - *cost of an efficient firm using new infrastructure*
  - *network can be re-designed*

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## Costing mark-up

- Constant mark-up
  - *same percentage to all services*
- Efficient Component Pricing Rule (ECPR)
  - *based on opportunity cost - considers retail prices*
  - *only works well if retail prices already competitively priced*
- Ramsey Pricing
  - *sets mark-ups inversely proportional to the price elasticity of demand*
  - *theoretically works well, but very difficult to implement*
- Floors and Ceilings
  - *allows the operator flexibility of assigning mark-ups within limits*

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## Cost models

- Benchmarking
  - *comparable costs in other jurisdictions*
- Top down modelling
  - *allocation of actual total costs to interconnect and other services*
- Bottom up modelling
  - *engineering model of the cost components of the interconnect service*

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## Benchmarking

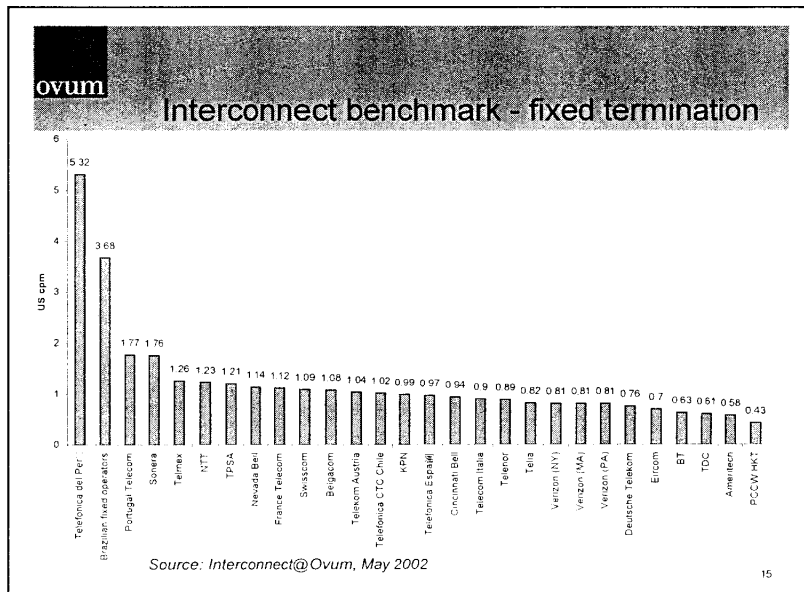
- Compares against interconnect charges in other countries
- Choosing the benchmark set is critical
  - *consider the comparability with the home country*
- The different interconnect charge structures need to be normalised for comparison
  - *Ovum approach: what is the average cost per minute to interconnect traffic with a given profile in each country?*

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## Benchmarking (continued)

- Advantages
  - *can be implemented quickly and with minimal development cost*
  - *compares to actual practice*
  - *useful for setting initial costs and to check the output of models*
- Disadvantages
  - *difficult to take into account the variations in operating conditions of the other countries*
  - *choice of the benchmark set is often contentious*
  - *does not directly examine local cost considerations*

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- Uses the operator's accounts as the starting point
- The accounting figures may be adjusted to give current costs
- Advantages
  - based on the actual costs of operating in the home environment
  - provides a strong audit trail
- Disadvantages
  - cannot fully take into account efficiency improvements
  - large effort to develop the cost accounting system
  - issues of commercial confidentiality



## Bottom up LRIC flowchart

Step 1: Establish network design

Step 2: Identify and determine capital cost of network elements

Step 3: Calculate operating expenditure

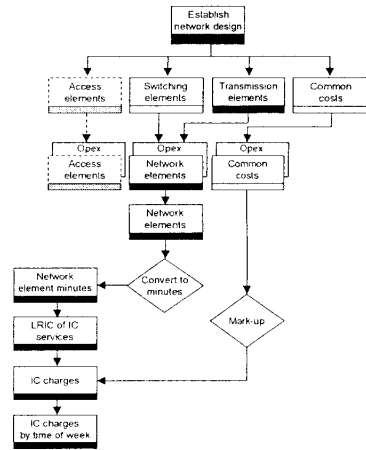
Step 4: Combine capital and operating costs into an annual costs per network element

Step 5: Divide network elements by minutes of traffic

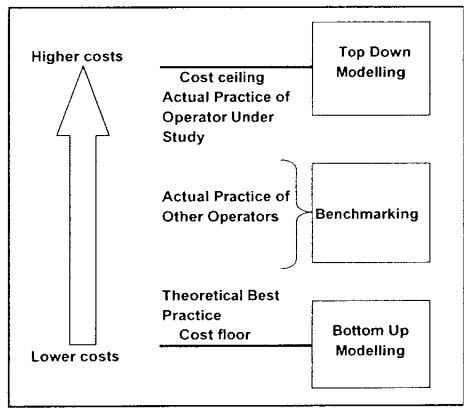
Step 6: Bundle network element minutes to calculate LRIC of each interconnect service

Step 7: Mark-up LRIC to set interconnect charge

Step 8: Deaverage charges



## Relationship between cost models



## Interconnection pricing

- Charge types
  - *once-off*
  - *ongoing*
- Charge structure
  - *level of alignment with retail charge structure*
  - *averaged or de-averaged*
  - *geographic*
  - *time of day (peak/off-peak)*
  - *call set-up / call attempts*

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## Interconnection pricing (continued)

- Stranded assets
  - *regulated prices removes the operator's ability to manage risk*
  - *obligated to provide service (and invest in sufficient infrastructure)*
  - *linked to allowed asset depreciation lives*
- Returns on capital
  - *cost of capital is a significant factor in determining interconnect prices*
- Asset depreciation
  - *return of capital*
  - *expected economic life is affected by risk of obsolescence*

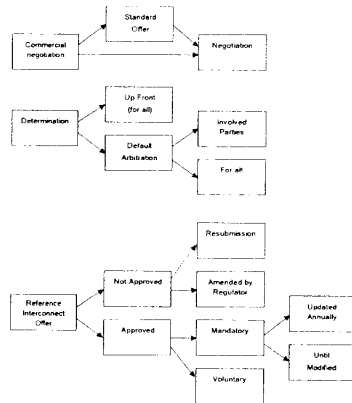
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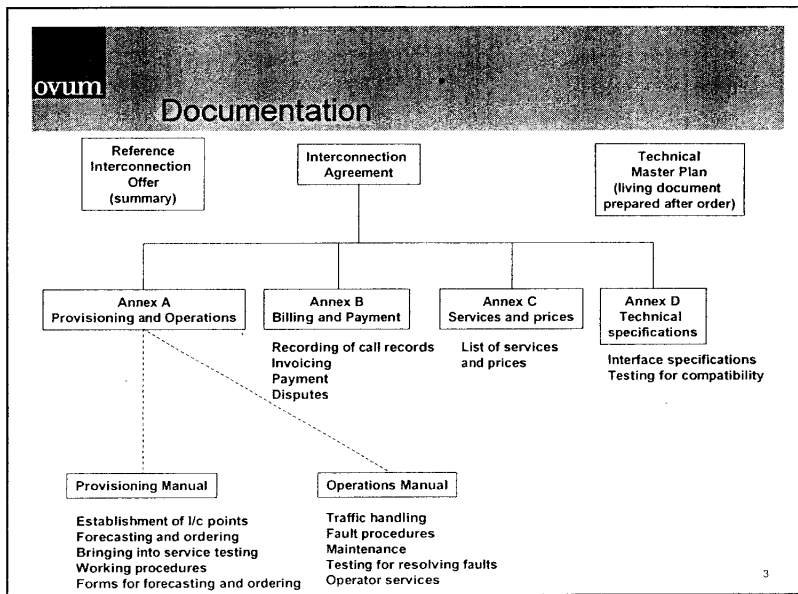
# APEC TEL Interconnection Workshop 2.2 and 2.3: Reference Offers and Agreements

John Horrocks

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## Process for reaching agreement



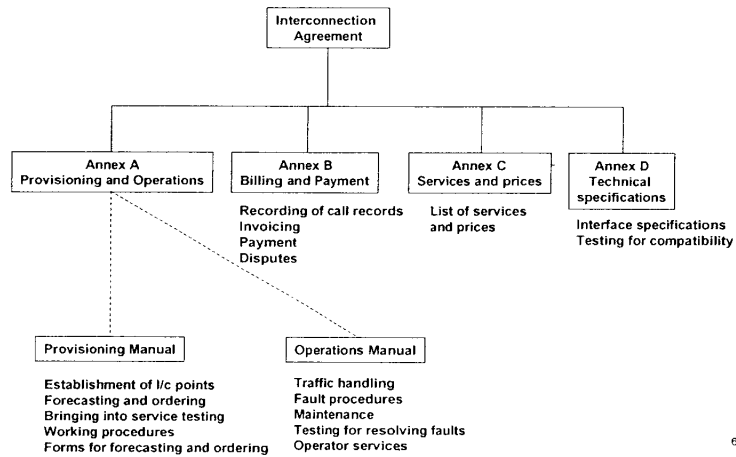


- ovum** RIO - 1
- RIOs may be mandatory or voluntary depending on the country. Almost always will need regulatory approval
  - Roadmap of documents
  - Form of interconnection (eg In Span)
  - Compatibility principle (new entrant adapts to incumbent)
  - List of main interconnection services and responsibilities for ordering
  - Prices
  - Timescales for establishing and ordering capacity
  - Procedure overview for establishing and ordering capacity
- 4

## RIO - 2

- Interconnection points and coverage
- Frequency on invoicing and times for payment
- Main points of contact
- How to obtain documents
  
- Good concise RIO
  - *Helps incumbent top management*
  - *Helps regulator and gives good impression*
  - *Facilitates discussion with new entrants and saves resources*

## Interconnection Agreement





## Interconnection Agreement Problems

- Legal text and consistency with the annexes
- Duplication between different parts and inconsistencies
- Length (>1000 pages)
- Documents are written by too many different people
- Poor documents cause practical problems
  
- Inconsistent with practice as only covers incumbent's responsibilities
- Seldom updated as practice changes

## Hints

- Good easily used documents save much time
- Have 1-2 people controlling all the documents
- Build list of contact points into documents
- Publish on the web
- Use hyperlinking for cross references and definitions
- Use macro based techniques for checking
- Don't just copy a big respected operator as some have very poor documentation
- Good documents help good organisation!

## Technical Master Plan

- Contains up-to-date details of all interconnections between pair of operators concerned
- Living document
  
- Need to support interconnection with an adequate database for orders and current status
- Operators need to keep interconnection information centrally

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## APEC TEL Interconnection Workshop

### 3.4: Enforcement

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### Enforcement - what is it?

- Creation of new requirements to curb unforeseen undesirable practices
- Application of penalties
- Withdrawal of privileges
- Aim is a faster, cheaper and more expert response than the Courts can provide
- Requires an adequate legal basis and an appeals process

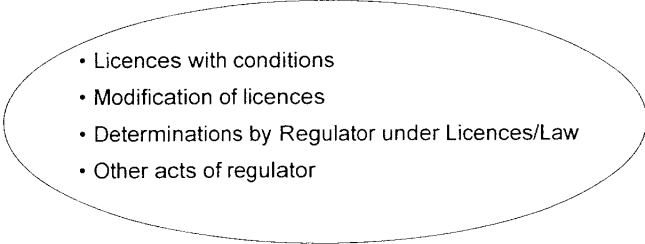
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## Comments

- Least standardised area of telecoms as the most influenced by the national legal system
- Effective fast enforcement is essential for the move from monopoly to a competitive market
- Involves difficult judgements for the Regulator as can make things worse
- Regulator's other weapon is the Press

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## Position in legal system

- Telecommunications Law
  - Competition Law
- 
- Licences with conditions
  - Modification of licences
  - Determinations by Regulator under Licences/Law
  - Other acts of regulator

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## Penalties

- Loss of licence
- A fine with possible escalation if breach continues
- Payment of compensation to customers or other operators (eg for failure in QOS)
- Removal of protection against civil suits for damages (eg for late provision)
- Need a "graded response"

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## Factors in enforcement

- Is legal basis adequate?
- Will there be a time delaying challenge?
- Does penalty match the problem and create appropriate incentive for stopping problem?
- Is timescale for application and effect appropriate?
- Will there be undesirable side effects on other parties?
- Will the market correct the abuse anyway?
- Can the issues be resolved in other ways?
  
- Regulator needs to be able to turn a blind eye

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## Lessons

- Many problems can be solved by meetings where the regulator outlines how he is "minded to act"
- Wide range of practice, in UK challenges to Oftel are few, BT normally accepts licence changes, in some other countries there are many law suits
- First big decisions are the key ones for the regulator
- Operators are frightened of poor decisions by regulators or Courts
- Small fines are effective at motivating the incumbents especially if reported in the Press
- New entrants are careless about their obligations and can be subject to enforcement

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