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A Discussion of Spectrum  
Licence Conditions and the  
Impact on New Entrants

Report presented to  
Vidéotron Ltée.

**October 2006**  
**(May 2007 update)**



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## **1. Introduction and Scope of this Report**

The purpose of this independent Report (prepared by Lemay-Yates Associates Inc. on behalf of Vidéotron Ltée.) is to provide a discussion of the impact of license condition on the entry of new players in wireless and specifically mobile telecommunications<sup>1</sup>.

Mobile services are a cornerstone of innovation and growth in telecommunications services in Canada as in other countries. The ability to deploy mobile telecommunications networks is premised on the availability of spectrum required to offer these services. As spectrum is a finite and public resource, allocation of spectrum licenses is controlled by governments and regulators worldwide. Hence, the conditions attached to the award of mobile spectrum also exert a significant impact on the ensuing industry structure and competition in services offered to consumers.

Over the years, different methods for spectrum allocation have been used, often coupled with different sets of conditions. Spectrum used to be awarded often on a first come and first serve basis or on a comparative selection basis, commonly referred to as “beauty contests”. As the strategic importance of spectrum has continually increased for telecommunications service providers over the last two decades, spectrum is now more often than not awarded on an auction basis in most countries.

Various conditions and eligibility criteria can be attached to the award of spectrum for wireless communications to further specific objectives. Among these are primarily found conditions related to network deployment requirements to ensure that the owner of licence actually does put it to good use. Other conditions are also attached either as part of the license terms or as part of the eligibility criteria to ensure that robust competition

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<sup>1</sup> Note – This LYA Report was developed independently for Vidéotron Ltée. by Lemay-Yates Associates Inc. (LYA). The Report is based on industry analysis and research conducted by LYA.



develops and is sustained in these markets. These criteria and conditions include among others 1) set aside spectrum for a specific category of firm, 2) a spectrum cap limiting the maximum amount of spectrum any firm can hold, 3) requirements or incentives to offer interconnect, resale and roaming to other carriers and service providers, either between 2G and 3G carriers or between 3G carriers themselves, 4) the permission to share infrastructure ranging from towers to base stations, often under specific guidelines from the regulator to ensure competition 5) the geographic limitations of the different licenses offered ranging from national to even city or regional based licenses, 6) the coverage requirements imposed on 3G licensees 7) foreign investment and any limitations that may be in place, 8) the requirement that mobile licensees remain independent for the duration of the license or can hold only one (1) license and 9) lastly but not least, the minimum bid price, often expressed in terms of a cost per person per Megahertz of spectrum (expressed as \$/MHz/pop).

The objective of this Report is to explore the eligibility criteria and license conditions put in place in other countries that have been successful in introducing new entrants in mobile telecommunications services over recent years. The more recent spectrum award processes (PCS and 3G) have been assessed for this purpose among a selected number of countries.

The focus on 3G licensing conditions is especially interesting considering that 3G spectrum was awarded at a time when, in most countries, incumbent 2G operators were already well established and the mobile markets well developed, similar to what will be the case in Canada. Furthermore, the initial 3G licensees were faced with significant difficulties arising from delays in the delivery of 3G technology as well as capital investment issues, which then translated into network deployment delays.



The countries selected are the US and UK, significant trading partners of Canada, as well as Germany, Sweden and Ireland, who have 3G networks in place and each awarded 3G spectrum starting in the year 2000 using different processes.

**Note: The May 2007 update to this Report consists of minor changes to Table 1.**



## 2. Summary of Key Findings

In 1995, when PCS licenses were awarded, the penetration of mobile services in Canada was very similar to what was found in OECD countries and just slightly below what had been achieved in the US. More than 10 years later, however, there is now a very significant gap of approximately 5 years between the mobile penetration achieved in Canada versus the average penetration in OECD countries and notably versus the UK as well as the US. In general during this period, Canadian consumers have been served by a lower number of mobile carriers and mobile service providers<sup>2</sup> overall than what has been the case in the countries included in this Report.

Based on our assessment, the key factors that have yielded new entry as well as sustained the number of facilities based mobile carriers in the countries reviewed are:

1. Awarding more licenses than there are incumbent carriers,
2. Spectrum set aside for new entrant, either as a condition of the auction process or via a criterion set as part of a comparative assessment (“beauty contest”),
3. Mandated roaming and resale,
4. No restrictions on foreign investment, both in the US and European countries,
5. License conditions that stipulate that each licensee can detain only 1 license.
6. The number of licensees affiliated with incumbent local telephone companies.

Other conditions which have supported entry and especially the sustainability of new carriers also include:



7. Slower network roll out requirements for 3G licensees, compared to the initial PCS licenses.
8. Extension of the duration of the licenses to 15 and even 20 years
9. Issuing a large number of regional licenses as is done in the US with the ensuing deployment of regional carriers, coupled with mandated roaming
10. The permission to share tower sites and network equipment under guidelines from the regulator ensuring that the level of competition is maintained and that agreements are not exclusive or discriminatory. While many regulators were initially wary of allowing infrastructure and network sharing thinking this would limit competition, the practical aspects of raising capital and ensuring a viable business for 3G operators as well as significant environmental impact and concerns demonstrate that in many cases, the benefits of infrastructure and network sharing outweigh the disadvantages.

Because of externalities including the timing of spectrum award and auctions or specific other market distortions, what governments and regulators may have expected as an outcome of new spectrum licensing did not always occur. In Germany, six (6) 3G licenses were originally awarded in an auction that could be characterized as having “gotten out of hand”. Now there are only four (4) 3G networks in operation.

Nevertheless, one final conclusion emerges from the various spectrum award processes reviewed. The intention of these regulators was clearly to increase the level of competition, in line with the EU regulatory framework for Electronic Communications, and the processes to award spectrum were set up to achieve this goal.

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<sup>2</sup> Mobile service providers include resellers and Mobile Virtual Network Operators (MVNOs)



The following table provides a high level comparison of the key aspects of spectrum licensing focusing on eligibility criteria and on conditions attached to the award of spectrum and ensuing results in terms of spectrum award and entry by new mobile carriers.

**Table 1 – Summary of Mobile License Conditions in Selected Countries**

	CANADA	US	UK	Germany	Ireland	Sweden
Successful result - entry of new competitor(s) via 3G/AWS licenses	<i>AWS not yet licensed</i>	Expanded regional carrier footprint, plus cable consortium (AWS auction Sept 2006)	YES (auction resulted in one new national carrier)	NO (auction had six winners, but only 4 incumbents are in service)	YES	YES
Number of 2G/3G licenses awarded	6 PCS per area cover country <i>(note 1)</i>	6 PCS and 6 AWS per area cover country <i>(note 1)</i>	5 national	6 national (12 blocks auctioned; 2 per licensee) <i>(note 3)</i>	3 licenses awarded in 2002, 1 licenses awarded in 2005 and later revoked. At least 1 new entrant, potential for 1 more.	4 3G licenses awarded in 2000 & 1 CDMA450 license awarded by auction in 2005.
Specific licenses designated for new entrants	NO	<i>note 2</i>	YES	NO (winning combination of licenses decided by bidders)	YES (licenses awarded as beauty contests)	YES (licenses awarded as beauty contests)
Total spectrum holdings limited	NO (spectrum cap removed in 2004)	NO (spectrum cap removed in 2003)	YES (one license per bidder)	YES .Licensees must also remain independent for the duration of the license.	n/a	n/a
Mandatory digital roaming	NO (analog only)	YES (common carrier requirement - manual)	YES (3G roaming onto 2G)	NO	YES (3G roaming onto 2G)	YES
Mandated tower sharing rules	NO	NO, but there are third party tower management firms	YES	Not mandatory but allowed and agreements in place under guidelines from regulator	YES	YES
Infrastructure sharing allowed under guidelines from regulator	Private agreements allowed without review from regulator or Industry	YES, but on a case by case review	NO initially, but modified post auction	Allowed and in place under guidelines from regulator	YES	Cannot be mandated by Regulator. Is strongly recommended.
Less stringent build out requirements for entrants	NO	YES	YES	NO	YES	YES (3G licensee build out to cover 30% of pops)
Structural separation of ILEC mobile operations	YES (removed in 1998)	YES (removed in 2002)	YES (BT divested mobile operations)	NO	NO	NO
Obligation to provide service to MVNOs	NO	NO	NO	NO. Resale is however mandated and widely used.	YES	YES
Foreign control of mobile carriers allowed	NO	YES	YES	YES	YES	YES
Duration of license	10 years	10 years (PCS); 15 years (AWS)	20 years	20 years	20 years	15 years

*Note 1: PCS was originally structured in six blocks; the 30 MHz C block was subsequently divided into three 10 MHz licenses*  
*Note 2: For PCS, the FCC set aside the C and F blocks for entrants; For AWS the FCC relied on various license types to facilitate bidding by large/small entities*  
*Note 3: Auction in 2000 resulted in six national licenses; subsequently one license was returned and one operator has not yet started up, leaving 4 national operators*  
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In European countries as in the US, the number of operators was increased after the award of 3G spectrum.



An assessment conducted by the EC in 2002 concluded that the number of licensees had increased by 26% (going from 47 to 59) across 13 countries which had completed 3G auctions<sup>3</sup>.

The US recently completed the auction of Advanced Wireless Services spectrum. The US market is still characterized by a patchwork of mobile operators and licensees, even after the recent wave of consolidation. One national new entrant emerged, namely SpectrumCo, as well as expansion of a number of regional carriers including Leap Wireless and MetroPCS.

Many countries have mandated or provided strong incentives for tower sharing. It should be noted that there are no federally regulated tower sharing rules in the US but that many local or state governments have put rules in place. In addition, the US has seen the growth of a major tower industry where towers are built by third parties and then leased to all the mobile and wireless carriers. This has significantly lessened the importance of any federally regulated tower sharing rules.

It should be highlighted that some countries have awarded additional 3G spectrum even after the initial licenses were awarded to enhance coverage and access across their entire territory. In some cases, new auctions for 3G spectrum may still take place in the future to re-award unused spectrum. None of the countries reviewed appears to preclude the possibility of new facilities based entrants in mobile communications in the future.

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<sup>3</sup> Comparative Assessment of the Licensing Regimes for 3G Mobile Communications in the European Union and their Impact on the Mobile Communications Sector, EC, Directorate General Information Society, June 25, 2002.



### **3. Setting the Stage**

#### ***3.1 Licensing and entry into the Canadian mobile telecommunications landscape***

Cellular or mobile services were launched in Canada on July 1, 1985 following the award of 2 licenses in the 800 MHz spectrum band in late 1983 by the then Department of Communications. One spectrum band (sub-band A) was awarded to Cantel Inc. (now Rogers Wireless) while an invitation was forwarded to telephone companies to provide service in spectrum sub-band B.

Even though the Canadian telecommunications services industry was overwhelmingly characterized by monopolies at the time, it was clear at the birth of mobile services that these would be offered on a competitive basis throughout the country.

Cantel was awarded a national license covering Canada's entire geography while the incumbent telephone companies each received a regional license covering the same territory as their incumbent telephone service area. In other words, the original analog cellular licenses were comprised of a mix of a single national as well as a number of regional licenses.

Cellular service was a completely new service and thus virgin territory. Nevertheless, a key condition set out at the time of the award of the licenses was the condition referred to as "no head start", meaning that neither party could launch service ahead of the other. This mainly prevented the telephone companies from leveraging their extensive networks to jumpstart the launch of their cellular service ahead of the Cantel launch.



Other conditions were set out to ensure a competitive playing field between Cantel and incumbent telephone companies<sup>4</sup>. These included:

- Structural separation of the cellular affiliated company and
- Build-out requirements, to be met within a specified timeframe.

With the two operators in place, the CRTC decided that there would be no need to regulate mobile service pricing and did not require the mobile operators to file tariffs.<sup>5</sup> This was some 10 years before the present Telecom Act – which “officially” gave the power of forbearance to the CRTC – was put in place.<sup>67</sup>

The next major step in the award of mobile spectrum in Canada was the award of Personal Communications Services (PCS) spectrum in late 1995 with service introduction in late 1996 or early 1997.

The PCS spectrum was awarded using a comparative licensing process. Regional as well as national licenses were made available. A total of 6 spectrum licenses in each area was available, but in the end only 3 national licenses were awarded (to Clearnet, Microcell and Rogers Cantel) while the ILECs again secured regional spectrum licenses covering their incumbent territories, similar to the spectrum obtained for analog cellular. No regional licenses were granted to new entrants. A specific set of conditions were set up to enable entry by the two new players. These conditions included:

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<sup>4</sup> There were also other license conditions related to R&D spending, for example.

<sup>5</sup> Telecom Public Notice CRTC 1984-55, Cellular Radio Service, October 1984

<sup>6</sup> A more detailed history of early regulatory issues in cellular service was provided by Telus in its submission to the CRTC concerning VoIP services in response to Telecom Public Notice CRTC 2004-2

<sup>7</sup> In addition to forbearance, CRTC oversight of the mobile industry has helped it develop by assuring that mobile carriers had access to telephone numbers, were able to interconnect and access ILEC extended area service areas, and by establishing rules for operation as a wireless CLEC.



- A spectrum cap i.e. a limit on how much spectrum could be held by one company, and
- The requirement for existing operations (Rogers Cantel as well as the ILEC mobility affiliates) to offer roaming on their analog networks to the 2 new entrants, Microcell and Clearnet, prior to obtaining the authorisation to launch their own PCS service .

This process resulted in two (2) new entrants in the Canadian marketplace at a time when penetration hovered around 15% (i.e. one cell phone for 15 out of every 100 persons).

These two new companies set out to build their national networks and operated independently. In 2000, Telus acquired Clearnet to secure a national footprint and expand its business in this rapidly growing segment.

In 2001, the leftover PCS spectrum was awarded in a spectrum auction. Licenses were regional and a total of 52 licenses were awarded of 62 on offer. There were no special conditions or eligibility criteria put in place to ensure entry by new entities into the Canadian mobile landscape. All major incumbent mobile licensees except Microcell, the only remaining new entrant from 1995, participated in the auction. The results of the auction were highly skewed towards Toronto. One new bidder (WNI Networks) secured regional PCS spectrum licenses covering Alberta and BC, and parts of rural Quebec, but was apparently later unable to obtain the appropriate financing. Its licenses were later acquired by Bell Canada in 2005.

In 2004, Industry Canada lifted the spectrum cap<sup>8</sup> and Microcell was shortly thereafter acquired by Rogers Wireless after an initial unsuccessful bid by Telus.

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<sup>8</sup>Lifting the spectrum cap was a condition associated with initial Telus bid for Microcell. IC lifted the cap a few months after the initial bid and before the acquisition process was completed.



As is shown above, Canada has on numerous occasions set out conditions for spectrum licenses and for mobile licenses to ensure competition and new entrants. However, the latest PCS spectrum auction resulted in no new entrant deploying a network.

### **3.2 *Other developments impacting the competitive landscape***

The Third Party Cellular Service policy released in 1998 changed the policies with respect to authorisation of cellular service in 800 MHz bands in unserved areas and enabled new entities, other than the original licensees, to apply for and obtain a license for a specific area, provided that no more than 1 service provider currently offers service in the proposed area. Examples of licenses under the Third Party Cellular Service policy are FirsTel to provide service to the Cree Nation in Manitoba.

In 2004, Virgin entered into a joint venture with Bell Canada to launch the first major MVNO<sup>9</sup> in Canada targeting the young urban population, as Virgin has done in other countries such as the UK and the US.

There are now a maximum of 3 mobile carriers and 1 major Mobile Virtual Network Operator operating in each local area in Canada.

A number of other types of service providers are also providing mobile services on a resale basis to their clientele. This includes Primus Canada, Eastlink in Halifax and more recently Videotron in many of its service areas in Quebec, among others. Telus has recently announced a resale agreement with Amp'd, a service provider focusing on the youth market already operating in the US. Service is expected to launch some time in 2007. The proposed service is expected to be Telus branded.

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<sup>9</sup> Mobile Virtual Network Operator

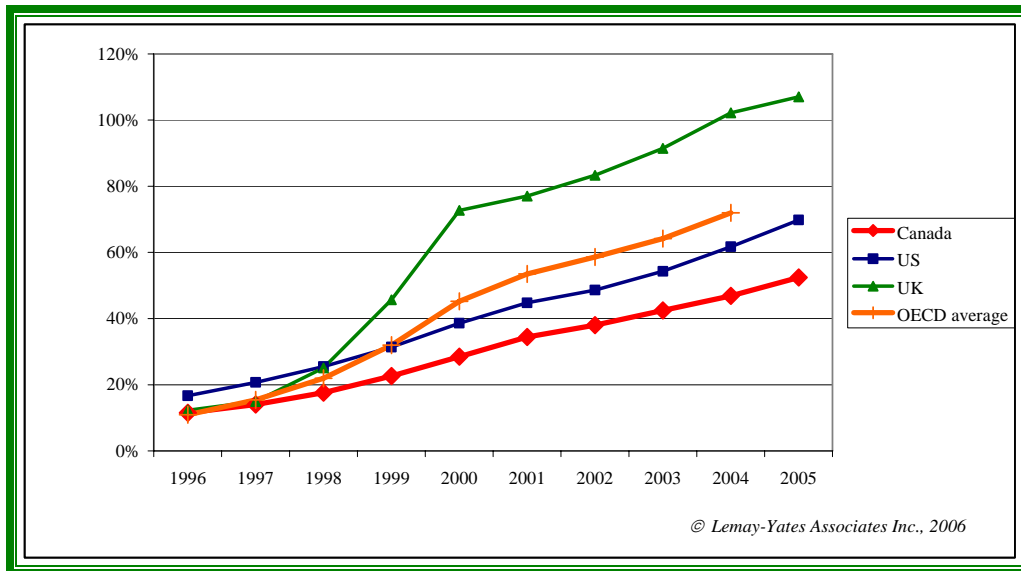


### 3.3 Mobile service penetration in Canada versus other countries

Against this backdrop, Canada has been lagging other countries around the world when it comes to mobile penetration, expressed as a % of the number of cell phone subscriptions on the overall population. .

The Figure below compares the evolution of mobile service penetration between Canada, the US, the UK and the OECD average starting in the mid 1990's to present to get a sense of where Canada stood in comparison to others some 10 years ago and where it does now.

Figure 1 - Comparison of the Evolution of Penetration of Mobile Services



In 1995, when Canada licensed new mobile operators, Canadian mobile penetration was on par with that of the OECD, the UK and only slightly below that of the US. While other countries have since shown significant growth in penetration – from the US at 70% to the UK at over 100% - Canada remains well below and currently stands at a similar level of penetration to what was achieved by the OECD average of five years ago.



Spectrum licensing and industry structure are believed to have had a significant impact on the slower growth of mobile penetration in Canada.



## 4. Wireless Licensing Conditions in Selected Countries

### 4.1 *US FCC auctions for mobile spectrum*

#### 4.1.1 History

In the US spectrum licensing is managed by the Federal telecom regulator, the Federal Communication Commission (FCC) established by the Communications Act of 1934. Since 1994 new spectrum licenses have been issued using an auction process.<sup>10</sup>

The process of issuing licenses by auction began with the implementation of the 1993 Budget Act, which included the addition of Section 309(j) to the Communications Act. This Section directed the FCC to use competitive bidding – auctions – to award spectrum licenses.

Prior to 1994 the FCC “mainly relied upon comparative hearings and lotteries to select a single licensee from a pool of mutually exclusive applicants for a license. The Commission has found that spectrum auctions more effectively assign licenses than either comparative hearings or lotteries. The auction approach is intended to award the licenses to those who will use them most effectively.”<sup>11</sup>

Since the auctioning process was established the FCC has planned 82 auctions and has conducted 66 of them. Auctions have covered licenses for services ranging from narrowband PCS (paging), direct broadcast satellite, digital audio radio services, AM and

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<sup>10</sup> A “spectrum license” is distinct from other types of licenses also managed by the FCC. Licenses many small applications can be obtained for individual radio channels in certain bands. Licenses in some bands are reserved for public safety agencies and are not auctioned. Off-air radio and television broadcasting licenses have also been awarded by auction, however the bulk of existing operators were provided with spectrum for “free” (as they were in Canada). For purposes of this report, the FCC process being discussed is for spectrum licenses that apply over broad geographic areas and where the license for a particular band is exclusive within the license area.



FM broadcasting and various fixed wireless services in bands including 2.5 GHz, 24 GHz, 39 GHz and others.

Eight of the auctions have been for mobile spectrum: broadband PCS (referred to herein as “PCS”) – and recently for advanced wireless services (“AWS”).

In 1994 when the FCC set out its plan to auction PCS spectrum, it correctly predicted that with some 2,000 licenses in total, that the PCS auctions would generate “billions” for the US Treasury as the largest auction of public assets in American history.<sup>12</sup> The success of the AWS auction will no doubt ensure that the trend of auctioning high value mobile licenses will continue in the US.

#### 4.1.2 Objective of the auctions

A clear objective of licensing PCS in the US was to increase the level of competition in the industry. Prior to PCS each geographic market was served by two cellular providers – the incumbent telephone company and a competitor.

In some markets, there was also a provider of specialized mobile services (“dispatch radio”) that targeted the broad consumer base, notably Nextel.<sup>13</sup> But “the duopoly nature of cellular service made it less than fully competitive”.<sup>14</sup>

The introduction of broadband PCS was intended to “benefit consumers by raising the overall level of competition in many already competitive segments of the

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<sup>11</sup> Per the FCC web site

<sup>12</sup> Fifth Report and Order in the Matter of Implementation of Section 309(j) of the Communications Act – Competitive Bidding, Report FCC 94-178, July 15, 1994, paragraph 1

<sup>13</sup> Dispatch radio is also known as “specialized mobile radio” or SMR. SMR services were initially licensed on the basis of specific radio channels and specific sites, thus SMR providers typically had a patchwork of coverage and targeted primarily business users (e.g. delivery services, trucking firms, etc.). In Canada the equivalent of Nextel is the Telus MiKE service.



telecommunications industry and by providing competition in other segments for the first time.”<sup>15</sup>

#### 4.1.3 Policies to stimulate entry

To ensure that licensing would result in an increase in the number of competitors, the FCC:

- Designated specific PCS blocks for new entrants and decided to license the six PCS blocks in three separate auction processes. The first was for the 30 MHz A and B blocks, licensed on large geographic areas referred to as “MTAs”. The second was reserved for new entrant “entrepreneurs” for the 30 MHz C and 10 MHz F blocks, licensed using smaller geographic areas known as “BTAs” and with a limitation that no one entity could hold more than 10% of the available licenses.<sup>16</sup> And the third was for the remaining 10 MHz D and E blocks, licensed also based on “BTAs”.<sup>17</sup>
- Build out requirements. The FCC requires that licensees build out infrastructure in their licensed areas, using a “substantial service” test. This means that by the end of the license term, a licensee has to be providing service to a level above that which would be considered “mediocre” in order to justify license renewal.<sup>18</sup> The FCC includes a variety of license types in terms of capacity and geographic coverage. The smaller licenses are intended to be more attractive to smaller operators, which could otherwise be more easily out-bid on large licenses.

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<sup>14</sup> First Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, FCC 95-317, July 1995, paragraph 4

<sup>15</sup> Fifth Report and Order in the Matter of Implementation of Section 309(j) of the Communications Act – Competitive Bidding, PP Docket no. 93-253, Report FCC 94-178, paragraph 3

<sup>16</sup> “Entrepreneurs” being defined as small business, rural telephone companies and businesses owned by women and minorities. Larger firms were allowed to partner with smaller ones.

<sup>17</sup> FCC 94-178, paragraphs 12 and 36

<sup>18</sup> See for example, FCC 03-251, paragraph 75



- Ruled that PCS could be useable for any mobile service, removing previous license definitions that were specific to telephone, dispatch, paging, etc. This added flexibility was intended to reduce the regulatory burden.<sup>19</sup>
- Imposed a spectrum cap limiting the existing cellular carriers to 10 MHz of PCS spectrum within their cellular license areas, limiting anyone to no more than 40 MHz of PCS spectrum and limiting total holdings to 45 MHz including PCS, cellular and SMR.<sup>20</sup> In 2001 this was increased to 55 MHz on a transitional basis and phased out on January 1, 2003. The blanket cap was replaced by a case-by-case approach to review specific transactions that would increase industry concentration.<sup>21</sup> No cap was applied to the AWS spectrum, given the “robustness” of competition.<sup>22</sup>
- Structural separation for the large incumbent local exchange carriers (ILECs). ILECs with cellular or PCS licenses were required to operate their mobile services in a structurally separate entity. They were also not allowed to engage in joint marketing (i.e. of fixed line and mobile services). These provisions were given a sunset date of January 1, 2002.<sup>23</sup>
- Recognized the importance of roaming.<sup>24</sup> While the FCC did not initially determine that there was a need for specific rules, it decided “to monitor the development of roaming service and to police actively any denials of reasonable

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<sup>19</sup> FCC 95-317, paragraph 48

<sup>20</sup> Ibid

<sup>21</sup> Report and Order in the matter of the 2000 Biennial Regulatory Review Spectrum Aggregation Limits For Commercial Mobile Radio Services, Report FCC 01-328, December 18, 2001

<sup>22</sup> FCC 03-251, paragraph 67

<sup>23</sup> Code of Federal Regulation Title 47, Section 20.20 (f)

<sup>24</sup> “Roaming” means allowing the subscribers of mobile service “A” to make use of the facilities of mobile service “B” when they are in the serving territory of “B” where “A’s” equipment is technically compatible with “B’s”



requests for roaming agreements”.<sup>25</sup> Subsequently, given that cellular customers generally had roaming available to them and given that roaming was considered to be highly valued by customers, the FCC extended the basic “manual” roaming rule to cover all providers of cellular, PCS and SMR services.<sup>26</sup> The obligation to provide roaming was then enshrined in the Code of Federal Regulations.<sup>27</sup> It is applied on a technology-neutral basis. As long as a subscriber is using a handset that is compatible with the carrier’s basestation equipment working in the area where that subscriber is roaming, then the carrier is obliged to provide service. The newly auctioned AWS licenses are captured by the same provision.<sup>28</sup>

- Although recent licensing has not specifically provided for set asides or caps that would favor new entrants, other FCC rules are intended to facilitate entry by smaller entities. This includes creation of streamlined rules for *de facto* transfer of control of a license and development of the rules for “spectrum managers”.<sup>29</sup> A spectrum manager is an entity allowed to enter into any leasing agreement without prior FCC approval as long as ownership of the license remains unchanged.
- Foreign entities restricted but subject to public interest test relating to non-dominance and control in foreign markets. Foreigners playing a key role in the

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<sup>25</sup> Second Notice of Proposed Rulemaking In the matter of: Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, FCC 95-149, April 20, 1995, paragraph 58

<sup>26</sup> Second Report and Order and Third Notice of Proposed Rulemaking In the matter of: Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, FCC 96-284, August 1996, paragraph 12

<sup>27</sup> Code of Federal Regulations, Title 47, Part 20.12 (c) “Roaming”, effective October 28, 1996: “Each carrier subject to this section must provide mobile radio service upon request to all subscribers in good standing to the services of any carrier subject to this section, including roamers, while such subscribers are located within any portion of the licensee’s licensed service area where facilities have been constructed and service to subscribers has commenced, if such subscribers are using mobile equipment that is technically compatible with the licensee’s base stations.”

<sup>28</sup> FCC 03-251, paragraph 85

<sup>29</sup> FCC 03-113



US market are notably Vodafone in JV with Verizon, and T Mobile, owned by Deutsche Telekom.

On the other hand, the FCC did not consider there was a need to put in place rules with respect to sharing of tower infrastructure. The FCC encourages licensees to share towers to the extent possible, but relies on local authorities and zoning rules to regulate the extent to which towers are shared.<sup>30</sup> Local authorities can also issue moratoria on siting of facilities to address local issues.<sup>31</sup>

Tower sharing rules are also perhaps less of a concern in the US since there are a number of third parties that manage large volumes of tower and rooftop assets, notably American Tower, Crown Castle and others.

One aspect of the FCC rules for the 1996 “entrepreneur” C Block auction that arguably “back-fired” was that the FCC provided small bidders with a number of advantages relative to large bidders. This included bidding credits, discounts, tax breaks and lower bid increments.

The presence of these incentives for one group of bidders relative to others no doubt contributed to the C Block attracting higher bid values than the earlier auctioned A and B Blocks which did not have these incentives.

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<sup>30</sup> The FCC “encourages collocation of antenna structures to the extent technologically feasible, and recommends that local zoning authorities engage the parties in cooperative efforts to chart the potential overlap of desirable locations, in order to minimize the number of antenna structures to be sited. It has also been our experience that personal wireless service providers are responsive to positive incentives to collocate, such as, for example, processing the zoning application of a collocating facility more quickly”. See: “National Wireless Facilities Siting Policies”, Fact Sheet #2, FCC, September 17, 1996, FAQ #10

<sup>31</sup> Based on guidelines established in 1997 by the FCC in conjunction with industry associations and State and local representation, following a petition by the CTIA. See FCC 97-264. There are also some carrier-carrier agreements, e.g. AT&T Wireless entered into an agreement with Sprint PCS concerning construction of new towers in 2003.



Although there were many defaults in auction payments, the gross bidding result in the C Block auction represented a value almost four times that of the A and B Blocks on a “unit” basis of \$/MHz/pop.<sup>32</sup>

Another factor increasing the value of the C Block auction was that it was the only license on offer in that particular case. The other entrepreneur license (F Block) was auctioned later at the same time as the D and E Blocks in early 1997. In auction “psychology”, when there is only one “lot” to bid on, the value is likely to be higher.

The bid values in the C Block auction – where that was the only license on offer – were about three times higher on a per MHz/pop basis than in the later auction where the D, E and F Blocks were auctioned at the same time.<sup>33</sup>

Therefore, other than the essentially artificial stimulation of bid values for the C Block due to the financial incentives provided to bidders and the fact that it was auctioned alone, the FCC approach to auctioning spectrum resulted in increased numbers of competitors, which was its main objective.

Despite the irregularities, irrational bidding and numerous court cases, defaults, etc., a number of competitors emerged. After various incarnations a number of smaller bidders remain in the market focused on regional areas – e.g. MetroPCS<sup>34</sup> and Leap Wireless<sup>35</sup>.

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<sup>32</sup> Gross bidding for the A and B Blocks in 1995 was US\$7 billion. Gross bidding for the C Block in 1996 was US\$13.4 billion and net bidding was US\$10 billion.

<sup>33</sup> Values rose again when a number of C and F Block licenses were re-auctioned in Dec 2000/Jan 2001 (Auction 35). The auction was conducted to re-award licenses that had not been issued due to payment defaults or had been cancelled or returned, notably by Nextwave. Nextwave had defaulted on approximately US\$4.2 billion of licenses in the 1996 C Block auction. Bidding in Auction 35 skyrocketed, notably driven by Verizon which by itself accounted for 50% of the entire auction. Subsequent court actions resulted in the dismissal of the bulk of the amounts bid and Nextwave retaining its licenses. Verizon subsequently acquired Nextwave in 2004 for US\$3 billion.

<sup>34</sup> The original bidder, General Wireless Inc., went bankrupt and eventually paid the FCC about 15% of the amount it had bid to retain its licenses. It became MetroPCS and launched service in 2002.



Both MetroPCS and Leap participated in the 2006 AWS auction. MetroPCS bid US\$1.4 billion for 8 licenses covering 144 million pops. Leap bid US\$700 million for 99 licenses covering 118 million pops.

Perhaps the most notable “entrant” that evolved from the C Band bidding is T Mobile. T Mobile – now owned by Deutsche Telekom – is the fourth largest US carrier and had 2005 revenues of US\$15 billion.

In the 2006 AWS auction, T Mobile was the largest bidder, having bid on licenses for a total of US\$4.2 billion, 30% of the auction total. T Mobile’s 120 AWS licenses cover the entire US.

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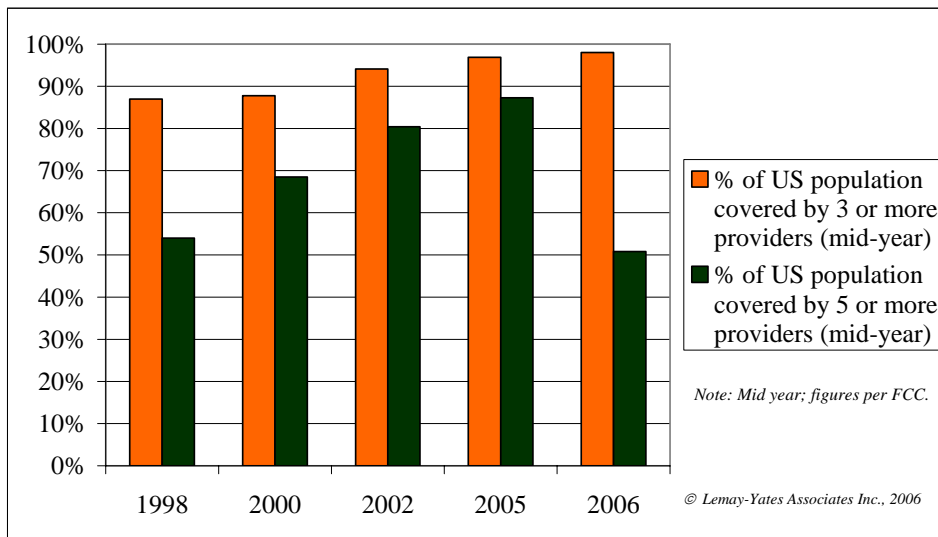
<sup>35</sup> The original bidder, DCR PCS, became Pocket Communications. Some licenses were sold to Cook Inlet Wireless and then to Leap. Leap was originally a subsidiary of Qualcomm, but was spun off in 1998 and underwent reorganization in 2003. Leap now has licenses covering 70 million pops.



#### 4.1.4 Results of the US PCS Auctions

The US auctioning process resulted in increasing competition as evidenced by the evolution in the number of competitors in the market over time, highlighted below.<sup>36</sup>

**Figure 2 – Evolution of number of US competitors**



In 1998, shortly after the main PCS auction processes were completed, approximately 87% of the US population was being served by three or more competing mobile providers. By mid-2005, 87% of the population was being served by five or more providers, although with recent mergers this is declining.<sup>37</sup>

<sup>36</sup> Tenth Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, FCC 05-173, Table 9 for 2000, 2002 and 2005. For 1998 estimated based on Third CMRS Report FCC 98-91. Note - the FCC changed data collection method for the 2000 report. Previous reports had been based on provider presence by BTA estimated by the FCC. Subsequent reports were based on presence by county based on carrier filings. Thus there is limited comparability before/after 2000 - pop coverage was likely somewhat overstated in the pre 2000 reports.

<sup>37</sup> In the US there are four national brands: Verizon, Sprint Nextel, AT&T and T Mobile, including the integration of AT&T/SBC/Cingular in 2005. In addition there are smaller regional providers such as MetroPCS and Cricket (Leap Wireless) as well as many smaller ILEC-affiliated wireless operators and rural carriers. On September 26, 2006 the FCC released new coverage data showing that the % of population covered by 5 or more providers has declined from 87% to 51%, while coverage by 4 or more



Also, the fact that the licenses had tangible value from the auction process provided licensees with an incentive to build out and price service aggressively to attract customers. In economic terms, an auction payment represents an up-front investment or “sunk cost”.

While auction proceeds represent a significant expenditure by operators, the growth rate in subscribers was stimulated by the increased licensing, as was capital investment. By mid-2005 cumulative capital investment by the industry represented almost US\$900 per mobile subscriber, whereas bidding in the FCC PCS auctions represented about US\$90 per mobile subscriber.<sup>38</sup>

The auctioning of many licenses over the years had a clear impact on the growth in subscribers and in overall investment by the industry.

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increased from 93% to 94% (presentation “Report to Congress – Eleventh Annual CMRS Competition Report”). Note figures exclude possible increases in competition resulting from the AWS auction completed September 18, 2006.

<sup>38</sup> Investment per subscriber estimated using data from the CTIA; auction proceeds net of defaults and dismissed bids estimated from FCC information.



#### 4.1.5 Discussion of the results of the AWS auction and of its applicability to Canada

Although the specific mechanism used by the FCC to award the C Block entrepreneur licenses was flawed, the objective of the licensing to stimulate entry was met.

Had the FCC not provided artificial financial incentives and/or had included the C and F Blocks in the same auction as other Blocks the result would quite likely have been different. Entry would have been ensured, but the over-bidding and defaults would likely have been avoided. It is worth noting that while the C and F Blocks were reserved for entrepreneurs, this did not prevent these entrepreneurs from bidding on other Blocks.

Combining the various Blocks into one auction, albeit more complex for the auctioneer, provides bidders with more lots on which to bid and tends to even out bidding. Since the various Blocks all essentially serve the same purpose – providing mobile service – there is no logical reason why one Block should be valued more highly than another.

The FCC appears to have learned this lesson for the 2006 AWS-1 auction, which began August 9 and ended September 18, 2006. All six AWS Blocks were subject to simultaneous bidding and were not divided up into different auctions as the PCS Blocks had been.

Interestingly, however, since there was no AWS Block designated for new entrants or entrepreneurs, and no more spectrum aggregation limit, the bulk of the AWS bidding will result in award to incumbents or affiliates of incumbents.

Even though it did not end until Round 161, by Round 51 bidding had essentially played out with the total at US\$13.3 billion, slightly lower than the final figure of US\$13.7 billion. The top 6 bidders – all affiliated with incumbents – accounted for about 93% of the bidding amounts... T Mobile \$4.2B, Verizon \$2.8B, SpectrumCo (representing a



number of large cablecos with Sprint Nextel) \$2.2B, MetroPCS \$1.4B, Cingular \$1.3B and Cricket (Leap Wireless) \$700M.

Although it is affiliated with incumbent Sprint Nextel, SpectrumCo is owned by cablecos – Comcast has 52%, Time Warner 28%, Cox 10%, etc., and Sprint Nextel’s participation is non-voting. Thus SpectrumCo clearly represents a possible new entrant across the country, although there is the possibility of co-branding services with Sprint/Nextel in some areas.

Also the bidding of MetroPCS and Leap Wireless could serve to expand their respective footprints, increasing competition in a number of areas – e.g. MetroPCS in the Northeast and West regions, expanding from its Southern base, or Leap in many non-core markets across the country.

At the outset of the auction, there were 168 approved bidders, some of which could have been new entrants. The bidder that put in the largest deposit to participate in the AWS auction was “Wireless DBS LLC”, a consortium of DirecTV, Echostar and Liberty Media. This group had been widely speculated as being a potential entrant – using the AWS spectrum for high speed Internet to complement satellite-based services. Wireless DBS perhaps had miscalculated the worth of AWS. It withdrew early on in round 17 having placed bids totalling \$626 million for 9 licenses in round 10.

If one lesson emerges from the recent US AWS auction, it seems to be that issuing a large number of regional licenses, with more license than incumbents in most areas, coupled with mandated roaming requirements can yield new entry into the mobile communications market.



## **4.2 *United Kingdom***

### **4.2.1 History**

Spectrum licensing in the United Kingdom (UK) is now the responsibility of the “converged” regulator, the Office of Communications or “Ofcom”. Ofcom was established by the 2003 Communications Act and was born from the amalgamation of five “legacy” regulators covering telecom, broadcasting and radiocommunications. The most notable of these regulators from a mobile services perspective were the former Office of Telecommunications (OfTel) and the Radiocommunications Agency (RA). Ofcom began operations at the end of 2004.

The UK was first “out of the blocks” in Europe when the RA auctioned “3G” mobile spectrum in 2000. Prior to the 3G auction the UK was being served by four national providers – BT CellNet, Orange, Vodafone and T Mobile (originally One-2-One) – and there were close to 20 million subscribers (33% of population).

In late 2001 BT spun off its mobile operations into a new entity that became known as O2. O2 is no longer affiliated with BT, having been acquired in 2005 by Telefonica of Spain.

### **4.2.2 Objectives**

The 2000 auction in the UK was specifically structured to facilitate entry by a new competitor. There were five licenses to be auctioned, one of which was reserved for new entrant bidding. This did not stop a non-incumbent from bidding on one of the other licenses, but only prevented incumbents from bidding on the new entrant license.



With four national incumbents this approach provided for vigorous bidding for all licenses while ensuring that each incumbent could acquire spectrum as well as ensuring that there would be a new entrant.

The Government's objectives in running the auction were set out as follows:

“The Government's overall aim is to secure, for the long-term benefit of UK consumers and the national economy, the timely and economically advantageous development and sustained provision of UMTS services in the UK. “Subject to this overall aim, the Government's objectives are to (i) utilise the available UMTS spectrum with optimum efficiency, (ii) promote effective and sustainable competition for the provision of UMTS services, and (iii) subject to the above objectives, design an auction which is best judged to realise the full economic value to consumers, industry and the taxpayer of the spectrum.”<sup>39</sup>

#### 4.2.3 Policies to stimulate entry

Initially the large customer bases and brand recognition of incumbents was seen as limiting interest by potential new entrants. Policies such as mandated resale and bidding credits were ruled out<sup>40</sup>, perhaps taking from the US problems with the C Band auction.

Nevertheless, the UK put in place a suite of strong criteria and policies to stimulate entry:

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<sup>39</sup> Objectives for the Auction, as announced to the House of Commons by the then Telecommunications Minister, Barbara Roche MP, on 18th May 1998, cited in “United Kingdom Spectrum Auction Third Generation – The next generation of mobile communications”, Information Memorandum, Radiocommunications Agency and N M Rothschilds & Sons, November 1999, page 4 (“Information Memorandum”)

<sup>40</sup> The Biggest Auction Ever: the Sale of the British 3G Telecom Licences, Ken Binmore, University College London, and Paul Klemperer, Oxford University, September 2001, page 7



- Mandated roaming on the incumbents' 2G networks on reasonable commercial terms, a condition put in place for until 2009. In a case of dispute, the regulator could set a rate at “retail minus”.<sup>41</sup> This was initially met with a legal challenge from two of the incumbents (One2One and Orange), although the initial ruling in their favour was subsequently overturned on appeal. With four incumbents, the issue was eventually resolved when two of them (BT and Vodafone) agreed to voluntarily providing roaming.<sup>42</sup> The respective licenses of BT and Vodafone were subsequently modified to require them to negotiate a roaming agreement on request by a new entrant.<sup>43</sup> National roaming was indeed a determining factor in the decision of Hutchison of Hong Kong (that backed TIW and eventually became 3 UK) to participate in the auction... “The statements in the information memoranda regarding national roaming were a material factor in Hutchison 3G’s decision to participate in the auction process and in its valuation of the license.”<sup>44</sup>
- No foreign investment restrictions. The UK had opened up its telecom market to foreign investment in the early 1990’s. At that time it wanted to encourage entrants to build wireline facilities to compete with BT. This resulted in entry by many foreign entities investing in cable television companies, including a number of Canadian firms such as Telus, Videotron and Fundy Cable. In fact by the time of the 2000 auction, the UK mobile industry was already benefiting from substantial interest by foreign parties. Orange had been purchased by Germany’s Mannesmann before the auction, and was then acquired by France Telecom after. One2One was eventually purchased by T Mobile of Germany and O2 by Telefonica of Spain. Canada’s TIW was the bidder for the spectrum that

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<sup>41</sup> Information Memorandum, op. cit., page 43

<sup>42</sup> Klemperer, op. cit., page 15

<sup>43</sup> Information Memorandum, op. cit., page 1

<sup>44</sup> Response by Hutchison 3G UK Ltd to the OFTEL Consultation on its Proposals to set a national roaming condition after 25 July 2003, 24 July 2003, paragraph 1.3



eventually became part of 3 UK, owned by Hutchison of Hong Kong. Hutchison was effectively backing the TIW bidding.

- License structure that ensured there would be an entrant. At the time of the 2000 auction there were four incumbents. The auction was for five national licenses. No one entity could buy more than one license and licenses could not be divided.<sup>45</sup> Hence the auction outcome could keep everyone “happy”. Each incumbent was able (but not obliged) to buy a license and a new entrant could buy the fifth license. In fact, even though there was only one new entrant license, the price paid was reasonably consistent with the price of the other licenses – the new entrant license was sold for £4.4 billion, compared to £4 billion for three of the incumbent licenses and £6 billion for one of the incumbent licenses.<sup>46</sup> In addition, the UK also awarded an additional 5 MHz of spectrum to the spectrum reserved for new entrant license to “encourage market entry and sustainable competition, to compensate for the advantages of existing 2G operators in rolling out the network”<sup>47</sup>.
- National licenses, but relaxed coverage requirements. The implementation of mandated roaming onto 2G networks was intended to “alleviate the initial inability to provide mobile telecommunications services across the UK.”<sup>48</sup> The network rollout obligation of the 3G licenses was set at 80% population coverage by the end of 2007 – about 7.5 years after the auction.<sup>49</sup>

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<sup>45</sup> Klemperer, Paul, “Auctions: Theory and Practice”, Princeton University Press, 2004, page 154

<sup>46</sup> Binmore and Klemperer op. cit., page 18

<sup>47</sup> Comparative Assessment of the Licensing Regimes for 3G Mobile Communications in the European Union and their Impact on the Mobile Communications Sector », European Commission, Final Report, June 25 .2002, P. 23

<sup>48</sup> Information Memorandum, op. cit., page 43

<sup>49</sup> Information Memorandum, op. cit., page 16



- Enforcement of tower sharing. Operators were “encouraged” to share facilities and other property. This is backed up in statutes giving the regulator the power to intervene case-by-case to resolve disputes and “may specify facility or property sharing arrangements (including physical collocation) after an appropriate period of public consultation”.<sup>50</sup>
- Neutralizing incumbency advantages in the auction bidding. With one license set aside for new entrants, the presence of incumbents in the same auction could not have a direct effect on bidding patterns. BT as large an entity as it is, though, could have had considerable impact on the auction if left unfettered. BT was not restricted from bidding in the auction.<sup>51</sup> But due to BT’s potential to “act anti-competitively in the market by subsidizing its 3G activities from the fixed business where it has Significant Market Power”<sup>52</sup>, BT’s participation in the auction came with the condition that it spin off its mobile operations into a fully separate company to hold the 3G licenses.<sup>53</sup> This approach ensured that as a bidder, BT3G would be essentially no different from any other bidder. This likely helped keep bidding patterns relatively consistent amongst the various licenses.

#### 4.2.4 Results of the UK 3G Auction

There were thirteen bidders in the UK 2000 auction; the four incumbents along with nine potential new entrants.<sup>54</sup>

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<sup>50</sup> UK Telecommunications (Interconnection) Regulations 1997, Statutory Instrument 1997 No. 2931, Section 10 (3)

<sup>51</sup> Its BT Cellnet unit was the second largest mobile carrier (after Vodafone) with a 30% market share

<sup>52</sup> Information Memorandum, op. cit., Section 3.1.7.1, page 33

<sup>53</sup> BT did this, creating BT3G Limited to hold the 3G licenses, which was a separate entity from BT Cellnet. Post auction, by late 2001, both BT3G and BT Cellnet became wholly owned subsidiaries of BT’s “de-merged” mmO2, which was in 2005 acquired by Telefonica.

<sup>54</sup> RA Press Release, P/2000/16, January 12, 2000



The potential new entrants were all either foreign firms or domestic firms with foreign partners. The nine new entrant bidders were:

- NTL (a UK cable company) in partnership with France Telecom,
- Telefonica (Spain),
- WorldCom (US) ,
- OneTel (Australia),
- Virgin Group in partnership with US-based Nextel and others,
- Global Crossing (US),
- Eircom (Ireland),
- Nomura (Japan) and,
- TIW (Canada, with backing from Hutchison of Hong Kong).

The UK's policies thus succeeded in attracting potential entrants and investors. A number of the losing bidders went on to be major players in the UK mobile market in other way, notably:

- Telefonica via its acquisition of O2 (the entity that evolved from BT3G),
- France Telecom's acquisition of Orange, and,
- Virgin Mobile that built a successful MVNO business, acquired by NTL in 2006.

The UK auction was of course characterized by very high bidding on all licenses. The various new entrants placed bids on the license reserved for new entrants as well as on the others. In the end, none of the new entrants could stave off the incumbents in licenses where incumbents were allowed to bid.

NTL hung on the longest of the new entrants other than TIW. It dropped out of the race for the new entrant license at £4.28 and moved its bidding to the other licenses that were



lower priced at the time. NTL was ultimately trumped by BT at £3.97 billion for the C license.

The auction ended after 150 rounds with TIW as the winner of the new entrant license.

Despite the high prices paid for the licenses, and notwithstanding the bursting of the telecom “bubble”, all of the winning bidders in the 2000 auction are active and continue to grow in the UK market.

- The new entrant: 3 UK, the entity evolved from the TIW bidding entity, now fully owned by Hutchison, launched in 2003 focusing on mobile video services. It now covers 88% of the UK population.
- The incumbents: BT’s spin-off became mmO2, introduced 3G and was acquired by Telefonica in 2005. Vodafone’s 3G network commercially launched in late 2002 and now covers 73% of the UK population. T Mobile’s 3G network went “live” in early 2004 and now covers 70% of the population. Orange (France Telecom) launched its 3G service in late 2004 and now covers 80% of the population.

Another factor contributing to the development of 3G networks in the UK was approval in 2003 of “limited” infrastructure sharing agreements for excluding the top ten cities in the UK, limited to smaller cities and rural areas. “National roaming in smaller cities can benefit from an exemption from the antitrust rules until 31 December 2007 for rural areas the exemption expires on 31 December 2008.”<sup>55</sup>

The UK license conditions also made no special provision for development of MVNO’s. Oftel gave “free reign” to operators to decide how to deal with MVNOs. It had decided



that operators would not be legally required to provide the services needed by MVNO's since it anticipated that the mobile market would be “effectively competitive” and given the prospect of new entry resulting from the auction.<sup>56</sup>

#### 4.2.5 Applying the UK experience to Canada

The result of the UK auction stands in stark contrast to auction activities in Canada. In the UK, there were four incumbents in 2000 and five licenses put up for auction where any one bidder could only acquire one license. This effectively guaranteed entry by a new player.

Industry Canada, unlike Ofcom, did not limit bidders in terms of numbers of licenses, only in terms of total spectrum. The limitation in the UK of only being able to acquire one license provided a cap on holdings. In Canada there was a spectrum cap defined in terms of capacity set at 55 MHz at the time of the auction (in 1999 it had been increased from 40 MHz<sup>57</sup>). The cap was set at a level that allowed each of the Canadian incumbents to acquire enough spectrum to block any new entrant.

So while the UK approach guaranteed there would be a new entrant, the Canadian policy effectively guaranteed that there would not.

In Canada, there were four national incumbents at the time of the 2001 auction. One of them, Microcell, did not participate in the auction, leaving three incumbents and four licenses in most areas. The arithmetic of the Canadian auction – where there were four licenses of 10 MHz each available – essentially worked as follows, with spectrum capped at 55 MHz:

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<sup>55</sup> European Commission, June 8, 2003

<sup>56</sup> “Development of third generation mobile services in the OECD”, DSTI/ICCP/TISP(2003)10/FINAL, December 2003, page 22 and Information Memorandum, op. cit., Section 3.1.2.1, page 29

<sup>57</sup> See DGTP-007-03, Section 5



- Bell Canada – In its ILEC territories had 25 MHz of cellular spectrum plus 10 MHz of PCS from the 1995 comparative selection process. This meant Bell could bid on 20 MHz within its ILEC territories and any amount elsewhere. As Bell’s first “foray” outside of its ILEC territory, this made it a new entrant of sorts in the other parts of Canada.
- Rogers – essentially the same as Bell, but already with a national footprint, meaning it could bid on 20 MHz anywhere.
- Telus – In its ILEC territories had 25 MHz of cellular plus 10 MHz of PCS, plus had acquired Clearnet, which had 30 MHz nationally as well as “enhanced specialized mobile radio” (ESMR) spectrum used for its MiKE service, which was calculated as 10 MHz for purposes of the cap. This led to Telus divesting of 20 MHz in its ILEC territories to meet the cap of 55 MHz (the returned spectrum also being included in the auction). But this also meant that Telus could bid on 10 MHz anywhere outside its ILEC operating areas without exceeding the cap.<sup>58</sup>

There was therefore 40 to 60 MHz available and Bell and Rogers could each generally bid for 20 MHz or more and Telus for 10 MHz... This meant that the 2001 auction had two results:

- In Telus ILEC areas (Alberta, most of BC and the areas served by Telus Quebec) Rogers acquired 20 MHz to “top up” to the cap in Alberta and BC. Bell acquired 30 MHz of spectrum in Alberta and BC as well as 10 MHz in the Telus Quebec area. A small bidder – WNI Networks – acquired the other returned Telus licenses

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<sup>58</sup> I.e. with 30 MHz from the Clearnet acquisition plus 10 MHz of ESMR, this meant Telus could acquire 10 MHz more without exceeding the cap.



in Alberta and BC, but these were subsequently (in 2005) acquired by Bell giving it 40 MHz, still under the cap.

- In other parts of the country, with a few small exceptions, the four 10 MHz licenses were all won by Rogers, Bell and Telus, consistent with the cap<sup>59</sup>. Telus acquired one license (the maximum it could add based on the cap) in five areas and Rogers and Bell acquired one or two each in all cases.<sup>60</sup>

The lack of restrictions on foreign investment in the UK – albeit pre-dating the 2000 auction – clearly helped to promote foreign interest in the mobile industry. The largest facilities-based operators are in fact owned by the Germans, French and Spanish.

In contrast, the Canadian auction attracted very little foreign interest. Sprint PCS of the US participated in the bidding initially but withdrew without winning any licenses.

It is not known if lack of mandated roaming impacted participation in the Canadian auction, in addition to the deleterious effects of license structure and foreign investment restrictions. Canadian roaming arrangements, relative to those seen in other countries, may also have had a dampening effect. Notably:

- The various ILECs, all using common CDMA technology, have a friendly roaming agreement amongst each other, built from the original cellular duopoly (where all the ILECs had the “B” licenses).

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<sup>59</sup> Except the license covering Thunder Bay, Ontario acquired by TBayTel Mobility, the ILEC, and except a number of areas where some licenses were left unsold at the end of the auction (e.g. Saskatchewan, Territories, etc.).

<sup>60</sup> Excluding the Telus returned spectrum, there were 12 license areas that received bids, each with 4 licenses of 10 MHz – i.e. 48 licenses. Two license areas received no bids – Territories and Northern Quebec. Rogers topped up its holdings by acquiring 23 licenses; Bell acquired 17 and Telus 5. As a result



- Clearnet – the 1995 new entrant – had implemented CDMA as well allowing it to roam into the ILEC networks, a “moot” issue in any event once it had been acquired by Telus.
- Microcell – the other 1995 new entrant – initially was the only operator using GSM technology. It had a roaming arrangement in place with Mobility Canada but only on an analog basis – requiring it to maintain dual-mode digital/analog handsets.

Rogers – initially as the only TDMA-technology platform (following the US AT&T Wireless approach) – transitioned its network to GSM. This gave it a common platform with Microcell; however Microcell was never able to get a roaming agreement with Rogers. Thus without mandated roaming, and with only one GSM-based “incumbent” to deal with, the two national GSM licensees did not roam onto each other. As with the Telus-Clearnet case, roaming became a “moot” issue once Rogers acquired Microcell in 2004.

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Rogers was at the capped limit in all areas except Southern Ontario where it bought one license, leaving two for Bell and one for Telus.



### 4.3 *Germany*

Germany held auctions for 3G spectrum in 2000, following the UK and just before investment in the telecommunications industry started to unravel. The auction went 173 rounds with four incumbents and six other bidders participating.

There were four 2G mobile carriers in Germany at the time, namely T-Mobile (the mobile arm of incumbent Deutsche Telekom), Vodafone, O2 (then Viag Interkom, a subsidiary of British Telecom) and ePlus (Hutchison).

A total of twelve spectrum blocks were auctioned and upon completion of the auction, six 20-year licenses (of two blocks each) were awarded yielding significant proceeds – almost US\$46 billion. Although this was 35% more money than the UK auction, it was less per capita given Germany's greater population. Each of the winning bidders in the German auction had bids totalling approximately US\$7.6 billion.

The key terms and conditions related to the licenses are summarized below:

- Bidding was done for either two or three blocks of spectrum (each block was 10 MHz), with the intended result to have either four licensees of three blocks each or six of two blocks each. The latter scenario played out resulting in the four incumbents and two new entrants all winning licenses.
- No mandated roaming with 2G or 3G networks. Preference was expressed for commercially negotiated roaming agreements.



- Resale mandated as for all services in Germany , meaning that new 3G operators would be in a position to have guaranteed resale arrangements with the existing GSM 2G operators and other 3G operators.
- Independence of ownership of the license for its entire duration, implying that one licensee can not sell its operations to another carrier during the terms of the license. The license conditions state that “any change in ownership that compromises the licensee’s independence will involve an examination of the grounds for revoking the licence...”.<sup>61</sup>
- No foreign investment restriction.

Several factors may have caused the German auction results to be so high:

- It followed on the heels of the frenzy of the UK auction, which built an expectation of the worth of 3G licenses,
- The license structure allowing bidders to bid on two or three licenses may have contributed to increasing values. Two blocks of spectrum would likely have been “enough” to implement a 3G network, thus bidding on a third block would have only served to try to prevent entry by other bidders. The value of the third block would be the value of reducing competition. The fact that the bidding went so high, may indicate that bidders may have underestimated the staying power of other bidders, eventually giving up at a higher price than otherwise would have occurred. It has been observed that the outcome of the auction in terms of

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<sup>61</sup> Ruling of February 18 2000 of the President’s Chambers on the Determinations and Rules for the Award of Licenses for the UMTS/IMT-2000 3G Mobile Communications



licensees would have been the same had it ended some 46 rounds earlier than it did – with total bidding about US\$18 billion less.<sup>62</sup>

- T Mobile (Deutsch Telekom) was owned by the German Government, creating a potential conflict situation – i.e. where prices could have been bid up to a level to ensure considerable revenues from the auction, from the maximum number of licensees (six).<sup>63</sup>

The German auction structure may have been intended to improve upon the UK model. The UK model, however, set out *a priori* the outcome in terms of market structure – there would be at least one new entrant. The German auction left it up to the bidders to determine if there would be an entrant or not – i.e. the auction could have ended up with the four incumbents each acquiring three blocks.

Through persistent bidding, the auction did result in two new national competitors – Mobilcom (France Telecom) and Group 3G (Telefonica and Sonera).

Struggling with their high bid amounts, the auction cannot be considered to have been successful in increasing competition in the German market at the facilities level, at least not yet. Mobilcom returned its license in 2003 with no financial compensation and Group 3G has yet to implement service, although its license has not been revoked.

Mobilcom however decided to take advantage of the mandatory resale arrangements in Germany and refocused its activities. It is now a large reseller of all 4 mobile carriers and boasts more than 4 million mobile subscribers at year-end 2005 as well as Internet service subscribers.

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<sup>62</sup> “The German 3G License Auction: Did the Government’s Stake in Deutsche Telekom Influence the Outcome?”, Robin Rander, Lund University, Sweden, April 2004, page 9

<sup>63</sup> This has been suggested by a number of parties and analyzed in theoretical papers but never proven. See for example, Robin Rander, *ibid.*



Further to the auction, the licensees requested clarification regarding sharing of tower sites and equipment to lower the capital investment requirements. The perception was that the conditions of the license prevented carriers from sharing towers and radio access equipment to lower overall costs and build out networks more rapidly.

The RegTP clarified these conditions in 2001 and effectively indicated that sharing of tower sites, antennas, cables, site support cabinets, and radio access equipment (base stations) was permitted as long as each license holder retains control of its network and is not impacted in its coverage areas and future planning. Sharing of core networks was not permitted to maintain independence of the licensees.

3G licensees have since entered into network sharing and national roaming agreements such as the agreement struck between T-Mobile and O2. The agreement covered extended site sharing to enable each party to reach 50% of its coverage obligation as required in its license condition by end of 2005, radio access network sharing and national roaming of O2 on the network of incumbent T-Mobile (but not vice-versa) within specified coverage areas of O2. The agreement is not exclusive. It should be noted that the Agreement had to be submitted for approval by the Commission of the European Communities under EU competition rules.

All four carriers have launched 3G services throughout Germany.

In 2005, the regulator launched a consultation for the award of remaining UMTS spectrum, including the spectrum returned by Mobilcom. The additional spectrum is expected to be awarded sometime in 2008. If there is more than 1 applicant, an auction is likely to be held. The comments from RegTP indicated that “further UMTS spectrum could be made available to current UMTS operators”...but that “it did not rule out that



potential new UMTS operators could also receive spectrum, besides recognising that the UMTS operators would require more than just the basic spectrum package”<sup>64</sup>.

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<sup>64</sup> Order 33/2005: Consultation of the availability of spectrum for UMTS/IMT-2000 3G Mobile Communications.



#### **4.4 Ireland**

Prior to the award of 3G spectrum, 2G mobile services were provided in Ireland by three mobile carriers, namely Vodafone Ireland Ltd., O2 Communications (Ireland) Limited and Meteor. Two out of the three operators were foreign owned.

Ireland awarded 3G spectrum in two phases. The first licenses (one “A” license and two “B” licenses) were awarded in 2002 in a comparative assessment process. Three licenses were awarded; one to Hutchison 3G Ireland, a new entrant, as well as one to each mobile incumbent, Vodafone and O2. The incumbent wireline telephone operator, Eircom, was not awarded a license.

The number of mobile licensees in Ireland was therefore increased by one (from three to four national carriers), with the addition of 3 Ireland (Hutchison).

Key requirements for the 3G licenses awarded in 2002 were: 53% of population to be covered within 3 years of license award and 80% within 5 years or June 2007, with a minimum bandwidth of 144 kbps in full mobility outdoors.

National roaming on the incumbents’ existing GSM networks was mandated for new entrants, but only after the new entrant had deployed its 3G network to 20% of the population of Ireland and to be effective for 5 years after the license award to the new entrant<sup>65</sup>. ComReg, the national regulator, could also lay down specific conditions to be observed by one or more parties to a National Roaming Agreement.

Access to MVNOs was also mandated as part of license conditions including a minimum 35% discount off of retail rates to be offered to MVNOs by mobile carriers. Such

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<sup>65</sup> License conditions for Hutchison 3G Ireland.



agreements had to cover all GSM and 3G services as well as a set of wholesale mobile features and functionality for the MVNO to offer similar services as the original licensee.

The regulator could intervene in MVNO negotiations if agreements are not reached within three months of a request. There are also terms and conditions to be met by MVNOs to ensure that the carriers are adequately compensated for up front costs and minimum usage requirements.

Site sharing was also mandated as part of 3G license conditions, for all of the sites under the control of a licensee, unless the licensee can demonstrate that there are capacity constraints at a particular site. Access to sites must be offered on a non discriminatory basis, i.e. different conditions cannot apply to different service providers. An overall framework for assignment of costs related to site sharing is also provided.

A second award of 3G spectrum was conducted in Ireland in 2005 for the remaining B license. Again, ComReg chose a comparative assessment process to award the spectrum and not an auction. There were three bids submitted: Eircom, Meteor Mobile Communications and Smart Mobile Ltd., an existing alternate service provider in Internet and telephony in Ireland. Minimum coverage requirements for the fourth license consisted of the largest 5 cities (53% of the population) by 2011, i.e. six years after award, and slower roll out conditions than for earlier licensees.

Smart Mobile was offered the license in November 2005 by earning maximum points on speed of network roll out and coverage and under the competition criterion<sup>66</sup>.

The license award was later withdrawn by ComReg apparently over a dispute over performance bonds and allegedly after pressure from the incumbent operator, Eircom. The issue is currently before the courts.



Hutchison 3G Ireland recently announced that its network now covers 80% of Ireland's population requiring 540 sites, and believes it is ahead of its schedule to meet its license requirement to cover 85% of the population by the end of 2007.

Depending on the outcome of the dispute over the latest 3G license in Ireland, there would be either 4 or 5 mobile operators after award, an increase of 1 or 2 operators over the competitive environment prior to the award of spectrum.

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<sup>66</sup> Smart Offered 3G Licence, ComReg Media Release, November 16 2005



#### 4.5 *Sweden*

Before the award of 3G licenses in Sweden, there were three GSM operators (900 MHz): Europolitan, Tele2 and Telia.

3G spectrum licenses were awarded by the Swedish national telecom regulator in December 2000 via a comparative assessment (beauty contest) process. Seven other aspirants applied for a 3G license in 2000. This included entities affiliated with a number of foreign operators including Orange (France), Hutchison (Hong Kong), Western Wireless (US), T Mobile (Germany) and others.<sup>67</sup> Four licenses were initially awarded: Europolitan (Vodafone), Hi3G (Hutchison), Orange Sverige (France Telecom) and Tele 2 (the cellular arm of Netcom). Telia, the largest incumbent, was not awarded a license.

After delays and difficulties experienced with the launch of 3G services, as was the case in many countries, there are now four (4) 3G operators, namely Vodafone Sweden (now owned by Norway based Telenor), Hi3G and , Tele2 and Telia ( who jointly control SUNAB, a 50/50 company set up to roll out their 3G network) . Orange has returned its 3G license which was later acquired by Tele2/Telia.

Before the launch of the 3G licensing process the Swedish government included a new section in the Telecommunication Act: “In certain circumstances and at certain times, operator with their own network for mobile telecommunication services are obliged to make nation-wide roaming available.” New licensees, however, were not allowed to implement service using only roaming and were required to build out to cover at least 30% of the population.<sup>68</sup>

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<sup>67</sup> 3G Mobile Policy: The Case of Sweden, prepared by Staffan Hulten, Stockholm School of Economics, for the ITU Telecommunications Case Studies, 2001

<sup>68</sup> Ibid, page 9



Hutchison 3G launched its service in May 2003. The network initially covered the top 3 major cities as well as a few smaller ones. The other 3G networks launched during the course of 2004.

Up to 100% tower sharing was strongly favoured for 3G licensees but could not be mandated by the regulator unless the Electronic Communications Act was amended. PTS is still unable to mandate sharing of towers by mobile carriers.

As of November 2005, each of the 3G operators provided coverage to at least 89% of the population.

Infrastructure sharing is allowed under current 3G licensing conditions as long as each operator has 30% of the population covered with its own infrastructure. Therefore, up to 70% of a licensee's network can be jointly owned and built. In its October 2005 decision, PTS estimated that the number of base stations could be reduced by up to 25% for the remaining network deployment of 3G licensees. This sharing of network equipment is allowed as long as there are no adverse effects on consumers. However, all companies continue to compete at the retail level thus increasing the competitive rivalry in the end user market and benefiting Swedish consumers.

MVNO access is stipulated for 3G operators to the extent that there is available capacity in the corresponding networks. There are a number of MVNOs active in the Swedish market, such as Spring Mobil targeting business users.

In 2005, an auction took place for the award of a new digital mobile license to re-use spectrum in the 450 Mhz band which had been previously used for analog cellular, namely the NMT-450 technology. Nordisk Mobiltelefon AS was the winner of the auction and has started offering service. Coverage requirements are for 80% of the



territory of each county, therefore taking advantage of the reach and propagation characteristics of mobile systems in the 450 Mhz band and enabling access to residents who live just about anywhere. The license is valid until March 2020 or 15 years from its award. Nordisk Mobiltelefon is also deploying CDMA 2000 technology in the 450 Mhz band in Norway. These networks are can offer broadband data with CDMA2000 1X EVDO technology and adequately compete with the other 3G networks.

Therefore, after the award of 3G and 450 Mhz new, Sweden can boast 2 additional mobile operators, being Hutchison 3G and Nordisk.

There could also be in the future additional licenses and licensees which could be used for mobile 3G and WIMAX deployment in Sweden. Sweden has initiated a spectrum award process for licenses in the 2.57-2.62 Mhz band designated for IMT-2000/UMTS use or 3G. It was proposed to award the spectrum based on municipal boundaries, as opposed to single national licenses, with the provision that a single operator could also secure licenses to cover the entire country. The proposed term of the licenses would be 10 years. Three 10 Mhz licenses are envisaged with a possible limit of 1 license per operator to increase the level of competition<sup>69</sup>. This could result however in 1 license per existing 3G operator as no spectrum set aside or specific eligibility criteria appear to be contemplated.

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<sup>69</sup> Post and Telestyrelsen, Invitation to submit views regarding licensing in the 2 570-2 690 Mhz band, November 3 2005.



#### *4.6 Applying the experience of Germany, Ireland and Sweden to Canada*

The award of 3G licenses and deployment of 3G networks has so far yielded entry by new carriers and thus increased facilities based competition in Ireland and in Sweden, but not yet in Germany.

Germany did not set aside spectrum for new entrants and did not mandate digital roaming. It should however be noted that resale of mobile services is mandatory in Germany and that as a consequence, a vibrant reseller market has developed and that one of the original 3G licensees (Mobilcom) subsequently chose to relinquish its spectrum but still participate in the market via resale arrangements with all four 3G licensees.

Ireland and Sweden clearly initially favored new entrants and carriers unaffiliated with their local incumbent telephone company when issuing 3G licenses with the objective of increasing competition. Even though in both cases, the incumbent telephone company eventually managed to secure 3G spectrum, the initial approach was successful in introducing new players in the market. What is important is to ensure that there are more licenses awarded than there are incumbent mobile carriers to enable incumbents as well as new entrants to participate in the market.

The European mobile market as a whole has also clearly evolved with multinational carriers as the cornerstone of implementing increased competition, hence the importance of not having restrictions on foreign investment. Based on the results of auctions and comparative spectrum award processes, the level of competitive rivalry would be significantly lower than it is now had it not been for foreign carriers investment.

What emerges as key factors for successful new entry are mandatory roaming and tower sharing as well as the ability to enter into network sharing agreements under guidelines



from the regulator and specific conditions that do not undermine competition. These conditions include non-exclusivity so that new entrants are not disadvantaged.

Owing to the nature of mobile markets, increased competition does not develop by itself but requires specific measures from policy makers and regulators. In Canada, critical measures aimed at promoting new entrants were notably absent from the additional PCS auction in 2001 and the result, no new entry, should thus be considered to be in line with expectations. The license eligibility criteria and conditions would need to be significantly modified for future spectrum awards if the goal of increasing competition and not just of promoting competition, as well as enhancing consumer benefits, are a priority.