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WHITE PAPER

Location, Location! The Compelling Need for Emergency Wireless Enhanced 911 Services and Comparative Policies in Canada, Europe and the United States

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EXECUTIVE SUMMARY

IDC Canada has conducted a broad comparative study on wireless enhanced 911 services (E911) offered in several jurisdictions. As part of this work, we have included the views of several leading first responder organizations in Canada who are stakeholders in both the use of wireless E911 features and on Canada's approach to implementation. Among the findings of this report:

- Canadian public safety experts recognize that Canada is "late in the game" in adopting new regulatory rules to implement wireless enhanced 911 services.
- Although safety officials generally applaud the CRTC for releasing a policy on wireless E911 in Feb. 2009, it has left important features to further study. This lag in adoption will continue to impede the provision of effective location-based emergency dispatch services to wireless users by Canadian public safety bodies.

Several public safety concerns with the CRTC Phase II E9-1-1 policy have been identified, including:

- **Percentage of mobile phones with Phase II E9-1-1 location capability**

  In the United States, more than 95 per cent of phones have high-accuracy E9-1-1 location capability.

  The CRTC policy will result in as few as 30 per cent of Canadian mobile phone customers receiving accurate locations for E 9-1-1 service when the service is implemented in February 2010 because the phones either need to have a special assisted GPS (A-GPS) chipset or wireless service providers need to provide a high accuracy network-wide solution.

- **Accuracy**

  Accuracy requirements for E9-1-1 location services are prescribed in the United States by rules mandating wireless providers that use a network-based location technology (e.g. triangulation) to pinpoint 67 per cent of calls within 100 metres, and 95 per cent of calls within 300 metres. For those that use a handset-based technology (e.g. GPS), the accuracy requirements are 50 and 150 metres. These accuracy levels must also be tested.

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The CRTC has noted the general levels of location accuracy available with location equipment on the market (10-300 metres), but it has not prescribed any precise requirements for location accuracy. The CRTC also has not mandated accuracy level testing.

- **Roaming**

  U.S. wireless service providers are required to provide location information for subscribers of other companies that roam on their service. This provides E 9-1-1 capability for out-of-region or foreign visitors who use their cell phones.

  The recent CRTC policy does not establish a similar requirement. For example, most out-of-country visitors to the Vancouver Olympics would not be accurately located if they placed a 9-1-1 call on their cell phones. The issue of whether roaming subscribers will be able to access 9-1-1 service in Canada has been delayed to an unspecified Stage 2 implementation timeframe.

- **Mid-call location updates**

  Public safety officials often require the ability to check a 9-1-1 caller's location in the middle of a call which allows the caller to be found even if on the move, whether in the trunk of a car or wandering lost in a forest. While this function is not strictly required in the U.S., it is broadly available in the United States.

  In Canada, the question of whether mid-call location updating will be available has been delayed to an unspecified Stage 2 implementation timeframe.

The report also finds that:

- The E911 initiatives in the United States and E112 initiative in Europe are being implemented in strikingly different ways yet both require wireless carriers to be able to inform emergency services of any caller's location using high accuracy technology.

- There is a widely recognized need among the Canadian public safety community for the CRTC to take a definitive leadership role in cooperation with municipalities in setting national wireless E911 policies and standards.

Among the key observations made by select officials and representatives of Canadian public safety organizations we interviewed are:

- "The world of communications is definitely changing and wireless 911 has caused us some concern." - William Blair, Chief of the Toronto Police Service.

- "Wireline communications will become an exception in the near future." - Richard Finn, Superintendent and Officer-in-Charge of Information Services for York Regional Police.

- "If this policy is a one-shot deal then it won't be enough." - Curtis Brochu, Manager, Public Safety Communications for The City of Calgary.

- "The longer the second stage is put off, the more it's a problem for our 911 PSAP centre." – Vera Danyluk, Mayor of Ville de Mont-Royal, Que. and Vice Chair of the Public Security Commission of the Agglomeration Council of Montréal.

- "We would have liked a requirement to implement these [Phase 2 second-stage] services within 18 months." - Ken Shymanski, President & CEO of Vancouver-based **Emergency Communications for Southwest British Columbia Inc**. ("Ecomm911").

- "Setting performance metrics is crucial." - Curtis Brochu, Manager, Public Safety Communications for The City of Calgary.

- "Without metrics, how do we know what we've achieved?" - Richard Finn, Superintendent and Officer-in-Charge of Information Services at York Regional Police.

- Standards must also take into accounts the geographic vagaries of local areas across Canada. - Vera Danyluk, Mayor of Ville de Mont-Royal, Que.

- "We need a strong federal 911 strategy that marries policy with funding relief." - Ken Shymanski, President & CEO, Ecomm911.

- Next-generation LTE wireless network technology will make it easier to solve the twin problems of providing locations of wireless roamers and pre-paid users. - Richard Finn, Superintendent and Officer-in-Charge of Information Services for York Regional Police.

METHODOLOGY

IDC Canada supplemented its examination of the secondary literature on wireless enhanced 911 service in Canada, the United States and the European Union with primary interviews of officials or representatives of Canadian public safety organizations. These interviews were conducted in order to ascertain:

- awareness and knowledge of the CRTC 2009-40 policy;

- familiarity with the details of that policy, and specifically the impact of:

  - the further staged implementation of Phase II wireless E911 in Canada as outlined in CRTC 2009-40;

  - the absence of certain features integral to Phase II wireless E911 services comparable to those currently being implemented in the United States due to the deferred second stage of Phase II in Canada (including: provision of mid-call location rebid updates; extension of wireless E911 location capability to geographic roamers and to unsubscribed (ie. pre-paid) handset users;

  - the lack of a comparable accuracy standard defined in CRTC 2009-40 and wireless provider reporting requirements as described in U.S. rules; and

- perceptions on the impact or significance that the further staging and the absence of those features and standards will have on their PSAP operations

SITUATION OVERVIEW

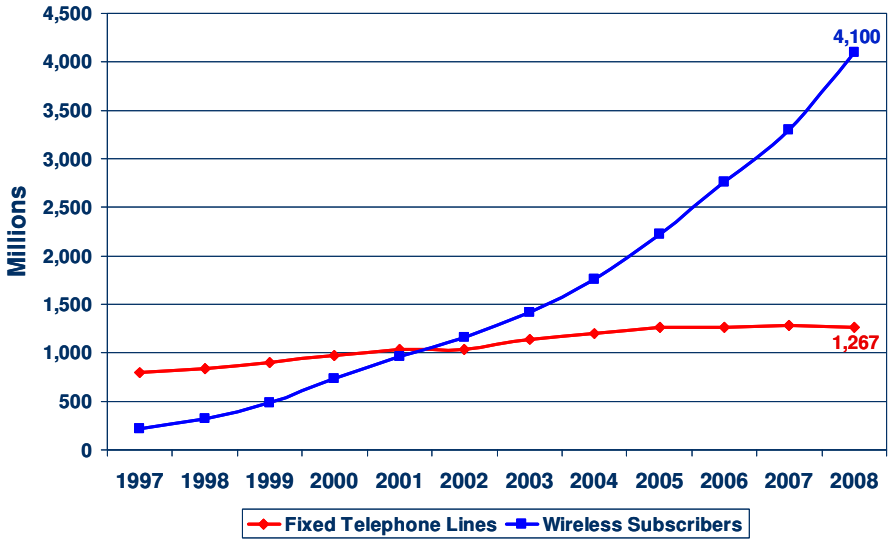
The Ascendancy of Wireless Communications

Location, location, location!

That familiar mantra of the real estate industry also describes the essence of new wireless emergency communications services. Termed wireless enhanced 911 (or "E911"), this technology to automatically transmit a caller's location has become of paramount importance to public safety and first responder emergency organizations, particularly given the increasing use of wireless communications. Wireless is now the preferred method of communicating the world over. Wireless adoption statistics from the UN's International Telecommunication Union show there were ***three times*** more mobile phone subscribers in the world than fixed telephone lines at the end of 2008 (shown in Figure 1).

FIGURE 1

Telecom's Big Story: Global Wireless Versus Fixed Telephone Line Subscribers, 1997-2008 (M)

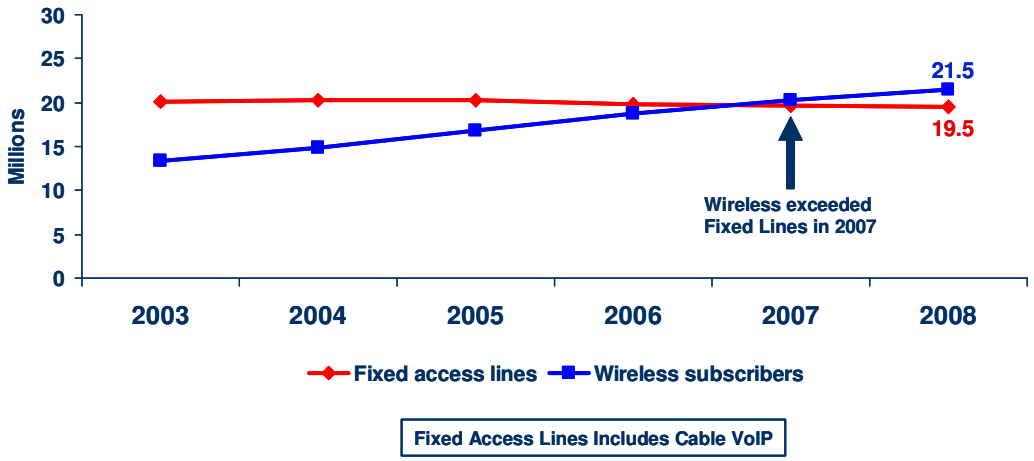


Source: International Telecommunication Union and IDC Canada, 2009

The number of wireless subscribers in Canada overtook the number of fixed wireline lines for the first time in 2007 as previously predicted by IDC Canada and shown in Figure 2 below.

FIGURE 2

Canadian Wireless Subscribers versus Fixed Telephone Line Customers, 2003-2008 (M)



Source: IDC Canada, 2009

IDC expects wireless penetration in Canada to rise to 27 million subscribers or almost 80 per cent of Canada's estimated population in 2012. Wireless is also now the single largest and fastest-growing segment in the Canadian telecommunications services market accounting for 38 per cent or C$15 billion of the C$39.4 billion-a-year sector. (Lawrence Surtees, Steve Yang, and Tony Olvet, *Wireless Wars 5: Canadian Wireless Forecast: 2008-2012* (IDC Canada #CA14TM8, December 2008)

But those indicators tell only part of the story of the increasing importance of wireless to the lives of Canadian consumers – and to the provision of public safety services.

Wireless Substitution Continues To Rise

Canadians are also replacing their traditional landline telephones with wireless – a phenomenon termed wireless substitution that is more widespread across Europe.

Arriving at a true count of wireless substitution is elusive due to the lack of a directory of wireless phone numbers necessary for proper survey techniques. Conventional telephone surveys, which are based on landline phone number directories, will grossly understate wireless substitution because they miss the actual substitutors. However, IDC's web-based Canadian consumer telecommunications survey found that more than 11.6 per cent of *respondents* said they use their cell phone as their only phone service. The actual incidence of wireless substitution is properly calculated from this data by applying that 11.6 per cent number to total wireless penetration. That yields a wireless substitution incidence among the 70 per cent of Canadians who own a wireless phone of 8 per cent.

IDC's estimate matches the Statistics Canada's estimate of wireless substitution in its recently-released 2008 Residential Telephone Service Survey that reported 8 per cent of Canadian *households* reported having cell phones only. (See: Statistics Canada. *The Daily*, "Residential Telephone Survey 2008," June 15, 2009.) In the United States, one-in-five (or 20.2 per cent) of homes have ditched their wireline phones, according to 2008 U.S. National Health Interview Survey conducted by the U.S. Centers for Disease Control and Prevention. (See: Stephen J. Blumberg and Julian V. Luke, *Wireless Substitution: Early Release of Estimates From the National Health Interview Survey, July-December 2008*, U.S. Centers for Disease Control and Prevention, National Center for Health Statistics, June 5, 2009.)

The prevalence of wireless substitution soars higher among younger Canadians. Younger households (comprised solely of adults aged between 18 and 34) were much more likely to use only a cell phone, with more than one-third (34.4 per cent) of Canadian households in this demographic group relying exclusively on cell phones.

Wireless and Public Safety

This increased reliance on wireless communications, especially as the sole means of voice communication, has posed a major new problem for public safety officials, namely, how to locate a caller to effectively dispatch emergency response services when 911 calls are made on wireless devices.

And the number of calls made on wireless devices to 911 emergency dispatchers – termed Public Safety Answering Points (or PSAPs) – has skyrocketed along with the soaring use of wireless. More than one-half (51 per cent) of all 911 calls in the Greater Vancouver Region and Sunshine Coast of southwest British Columbia are now placed from wireless devices, according to recent statistics reported by **Emergency Communications for Southwest British Columbia Inc**. ("Ecomm911"), the region's consolidated central emergency communications PSAP centre. (See: Ecomm911, *News Release*, Vancouver: June 25, 2009.)

The number of calls made on wireless devices to 911 emergency services has skyrocketed along with the soaring use of wireless.

911 calls are typically routed to a single Public Safety Answering Point (PSAP), which is a facility equipped and staffed to receive 911 calls. The PSAP then passes the call to the required first responder dispatch centre. On wired line calls, systems have evolved over the years in North America to route a 911 call to the correct public service answering point (or PSAP) based on knowledge of the phone number (Automatic Number Identification – ANI) and its linked geographic address (Automatic Location Identification – ALI). Enhanced 911 refers to the necessary network switching, database and elements for delivering the voice call to the proper PSAP along with the associated ANI and ALI information.

The need for Wireless Enhanced 911

Although cellular phones are often marketed as safety devices, it is not commonly realized that 911 calls may not get routed properly. That is because the address information was not automatically linked to a wireless phone device. Coupled with the very act of mobility, that meant public safety dispatchers often have to verify a caller's location verbally which is subject to both human error and the exigencies of life-threatening emergencies when a person is often unable to speak.

Although cellular phones are often marketed as safety devices, 911 calls may not get routed properly.

"The wireline E911 system, while reliable, was jury-rigged upon a dead-end technology that continues to constrain the evolution of wireless E911 service," as U.S. expert Dale Hatfield remarked. (See: Dale Hatfield, Brad Bernthal and Phil Weiser, *The 9-1-1 Industry Alliance 2008 Study on the Health of the United States 9-1-1 Emergency Network: A Call to Action on 9-1-1*, Prepared for the US 911 Industry Alliance, by ColoComm Group, LLC, Boulder, Colo.: March 2008.)

Much of the early activity in wireless E911 was associated with inventing, developing, evaluating and selecting methods for locating mobile devices. A two-phase process has been adopted throughout North America:

- Phase I enables the 911 call centre to receive with a wireless 911 call the subscriber's wireless phone number and the location of the wireless cell site serving that customer.

- Phase II allows the 911 call centre to receive with a wireless 911 call the subscriber's wireless phone number and accurate location (latitude and latitude or “X,Y” coordinates) of the caller.

Network Versus Handset Solutions

There are two basic types of solutions – network-based solutions and handset-based solutions. In the case of network-based solutions, receivers at known locations (i.e., at base stations) measure the direction or the time of arrival of the signal emitted by the mobile unit. In the case of the latter, having a timing reference and knowing the speed that the radio signal travels is a constant, it is possible to very accurately estimate the range of the mobile unit from the base station. With a minimum of three base stations at known locations making the measurements, it is possible to unambiguously estimate the location of the mobile unit.

Systems like this are referred to as network-based solutions for the rather obvious reason that the measurements and calculations are done in the network. Network-based solutions work wherever the handset works, including in buildings and in urban settings, they don’t require special chipsets in the handset and support any handset, no matter the vintage, that works on the network. (See: Geoffrey Colman, "A Comparison of the Accuracy of TDOA and TOA Location Algorithms with Equivalent Receiver Geometry," *Technical Memorandum* DREO TM 2001-063, Department of National Defence, Defence Research & Development Canada, Ottawa: October 2001.)

In a handset-based solution, the situation is reversed with the handset making the measurements and the calculations. In one approach, the handset measures the time of arrival of signals transmitted from Global Positioning System (“GPS”) satellites and uses a similar triangulation technique to calculate its position. In the most commonly used approach, known as Assisted GPS (“A-GPS”), some of the required processing is actually carried out in the network to improve the performance of the system.

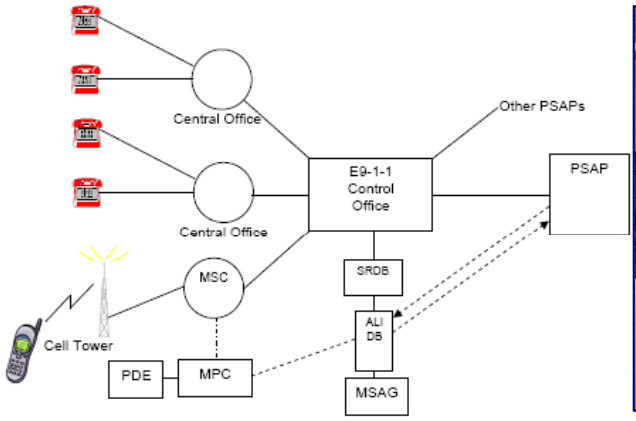
A-GPS provides very accurate locations (sometimes within 10 metres) when the handset “can see” three or more satellites – often in suburban or rural locations. Generally, in urban environments and within buildings A-GPS fails to provide any location measurement or provides inaccurate locations since the handset can’t see at

least three satellites. Also, to work A-GPS requires a special chipset be built into the handset when it is manufactured – older or less expensive phones often lack the requisite chipset to enable accurate A-GPS location.

The delivery of the location or X,Y information to meet the Phase II requirements is more complicated than the delivery of Phase I information. Phase Two of wireless E911 provides PSAPs with more accurate longitudinal and latitudinal (X,Y) information regarding the location of wireless subscribers when they make a 911 call.

FIGURE 3

Architecture of Wireless Enhanced 911



Metro Toronto Police 911 Communication Centre

Source: ColoCommGroup; Metro Toronto Police; IDC Canada, 2009

New features integral to the provision of wireless E911 services which have been adopted in other jurisdictions including the United States that offer potential benefits to PSAPs and emergency organizations include:

- Improved location-finding accuracy of the caller within 10-to-300 metres;
- Handling of calls from wireless roamers;
- Identifying emergency callers using pre-paid (or unsubscribed) wireless services; and
- Issuing rebids (or additional mid-call location-seeking queries) while a 911 call is in progress.

Wireless E-911 Policies

United States

The story of wireless E911 begins in the United States. The United States government, through the Federal Communications Commission (FCC), took the lead in putting the issue of wireless E911 on the agenda, initiated policy alternatives, and

provided an incentive and a forum for industry and public safety representatives to cooperate. (See: U.S. 47 C.F.R. §20.18(b).)

Cell phone tracking in the United States was propelled by a FCC mandate 15 years ago that all cell phones manufacturers must ensure that their handsets are "E-911" capable. (FCC, *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, Notice of Proposed Rule-Making, Docket 94-102, October 1994).

The FCC made its first order on wireless E911 13 years ago in 1996.

The FCC's first order on wireless E911 in 1996 set schedules for wireless carriers to provide both basic and enhanced 911 services. Under Phase I, wireless carriers must provide PSAPs with a callback number and the location of the cell site/sector receiving a 911 call. Under Phase II, the wireless carriers were required to provide to PSAPs the location of all 911 calls by longitude and latitude beginning October 1, 2001. At the time the Commission adopted its original rules, it was anticipated that the wireless carriers would use network-based location technologies for meeting the Phase II geographic location information requirement. The FCC also established a location accuracy requirement of 100 meters for 67 per cent of the calls and 300 meters for 95 per cent of the calls.

Subsequent technological advances allowed for the development of handset-based solutions leading the FCC to revise its rules in late 1999. But the commission also imposed a more stringent accuracy requirement for handset-based solutions: 50 meters for 67 per cent of calls and 150 meters for 95 per cent of calls.

Separate deployment schedules for network-based and handset-based solutions were also set. Once a U.S. wireless carrier has received a request for Phase II service, it has six months to install the necessary equipment and begin delivering the service to the requesting PSAP. In the case of network-based solutions, the wireless carrier must provide Phase II service for at least 50 per cent of the PSAP's coverage area or population with the six month period and for 100 per cent of the PSAP's coverage area or population within 18 months. (See: FCC, *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, CC Docket No. 94-102, Memorandum Opinion and Order, 188 FCC Rcd 23383, 2003.)

Since then, the United States has been at the forefront of setting the standards for wireless enhanced 911 services and features.

Roaming: U.S. wireless service providers are required to provide location information for subscribers of other companies that roam on their service. This provides E911 capability, for example, for out-of-region or foreign visitors who use their cell phones.

Mid-Call Location Updates: Public safety officials often require the ability to "rebid" or check a caller's location in the middle of a call (e.g. for a call from a moving vehicle). This functionality allows a caller to be found even if on the move, whether in the trunk of a car or wandering lost in a forest. While a 'rebid' function is not strictly required by the US FCC's Phase II E911 rules, a rebid capability is broadly available in the United States.

Unsubscribed Handsets: U.S. wireless providers are required to provide location information for 911 calls made on unsubscribed handsets. These are the handsets used, for example, by people who buy discount pre-paid services without a lengthy contract to control their spending, rather than subscribing to post-paid cell phone plans.

Accuracy: The FCC has prescribed accuracy requirements for E911 location services. U.S. wireless providers that use a network-based location technology (e.g. triangulation) are required to pinpoint 67 per cent of calls within 100 metres, and 95 per cent of calls within 300 metres. For those that use a handset-based technology (e.g. GPS), the accuracy requirements are 50 and 150 metres. In the U.S., accuracy levels must be tested in a manner which "reasonably reflect[s] the expected use of the handset".

Compliance Measurement Areas: In the U.S., it has been proposed that compliance be measured for a specified geographic area (i.e. on a county-by-county basis). Therefore, for example, a service provider cannot fail to comply in specific areas and make up for it by aggregating compliance data on a national basis.

Roll-out Schedule: In the U.S., wireless providers that use a network-based location technology were required to achieve 100 per cent coverage within 12 months of their initial roll-out of Phase II E 911 service.

The FCC also required wireless providers that used a handset-based technology to make 25 per cent of new handset activations location-capable within two months of their initial roll-out; 50 per cent within eight months; and 100 per cent within 14 months. Fifty months after initial roll-out, 95 per cent of subscriber handsets had to be location-capable.

A number of U.S. wireless providers were fined by the FCC for failing to comply with the E 911 rules.

Reporting: The FCC requires the larger wireless providers to file quarterly deployment reports to demonstrate their compliance with the FCC's E911 rules. All reports are published online.

European Union

EU Promotes Single Continent-Wide 112 Emergency Number

The directive of the European Union on universal access to telecommunications services imposes requirements on all member states to provide access to emergency telephone services. The increased integration of the member states within the European community fostured by the rise of the common Euro currency, coupled with the explosive growth of wireless throughout Europe, has given further impetus to efforts by the European Commission (EC) to implement a single EU-wide emergency telephone number. This 112 number, established in 1991 to operate alongside existing national emergency numbers, will also facilitate ubiquitous access to a single emergency number by wireless roamers.

The European Commission declared that 112 had become a Commission priority at a conference on the implementation of 112 in October 2005. In parallel, the Commission accepted publicly that it could not launch a pan-European information campaign because it was not satisfied with the implementation of 112 by Member States. In 2006, the Commission opened infringement proceedings against several Member States for non-transmission of caller localization to emergency services. Since then, Denmark, Finland, the Netherlands, Portugal, Sweden, and most recently Romania, have opted for 112 as the main national emergency number. In some other countries, 112 is the only emergency number for certain emergency services (such as Estonia and Luxembourg for ambulance or fire).

FIGURE 4

European Union Promotes 112 Emergency Number For Continent-Wide Wireless Roaming Access

Source: European Commission; IDC Canada, 2009

TABLE 1

Implementation of 112 in European Union

Member State	112 fixed & mobile access	Caller location available for mobile
Austria	Y	Y
Belgium	Y	Y
Bulgaria	N	n/a
Cyprus	Y	Y
Czech Republic	Y	Y
Denmark	Y	Y
Estonia	Y	Y

TABLE 1

Implementation of 112 in European Union

Member State	112 fixed & mobile access	Caller location available for mobile
Finland	Y	Y
France	Y	Y
Germany	Y	Y
Greece	Y	Y
Hungary	Y	Y
Ireland	Y	Y
Italy	Y	N
Latvia	Y	Y
Lithuania	Y	N
Luxembourg	Y	Y
Malta	Y	Y
Netherlands	Y	N
Poland	Y	N
Portugal	Y	Y
Romania	Y	N
Slovakia	Y	N
Slovenia	Y	Y
Spain	Y	Y
Sweden	Y	Y
United Kingdom	Y	Y

Source: European Commission *COCOM Survey*; IDC Canada, 2009

Article 26 of the EU Universal Service Directive (Directive 2002/22/EC) further obliges Member States to ensure that:

- Access to 112 is available in addition to any other national emergency call numbers, *free of charge*, to all end users of publicly available telephone services including users of public pay telephones.
- Calls to 112 are answered appropriately and handled in a manner best suited to the national organization of emergency systems and within the technological possibilities of the networks.
- For all calls to 112, public telephone network operators make caller location information available to authorities handling emergencies, to the extent technically feasible.

In a bid to catch up to U.S. programs implementing wireless E911, the EC established the Coordination Group on Access to Location Information by Emergency Services (CGALIES) in 2001 with the mission to define requirements for a Pan European common location provisioning mechanism that can be accessed and used by the European 112 community and emergency service operators.

Reporting & Performance Standards: In Europe, the approach is less restrictive than in the United States. CGALIES has issued recommendations to member states that carriers be capable of providing location information, but has not set specific performance standards.

An overview of mobile caller location capability and characteristics in EU states based on member replies to a European Commission COCOM Survey in January 2009 is listed in Table 2.

TABLE 2

Attributes of Mobile Caller Location Identification in EU Countries

EU State	Method and Time Needed for Request	Type of Location Information	Int'l Roamer Info	Nat'l Roaming	Reg'd Address Availability
Austria	Pull; up to 30 min.	Cell ID/Sector ID	Yes	Yes	Yes (except pre-paid)
Belgium	Pull	Cell ID/Sector ID	Yes	No	Yes
Bulgaria	Push	Cell ID	Yes		No
Cyprus	Push	Cell ID/Sector ID	Yes	Yes	Yes
Czech Republic	Push	Area (1 or more cells) with radius 1 km/70% to 5 km/70%; base station 700m/70% to 1500m/70%	Yes	Yes	Yes
Denmark	Push	Cell ID	Yes	Yes	Yes
Estonia	Pull; avg. 23 sec.	Coordinates	Yes		No
Finland	Pull; avg. 3-30 sec.	Cell ID/Sector ID	Yes(manual reqst)	No	Yes
France	Pull; avg. 10-30 min.	Cell base station postal code	Yes	Yes	No
Germany	Pull; avg. 5 min.	Cell ID/Sector ID	Yes	Yes	Yes
Greece	Pull; est. 7 to 60 min.	Cell ID	Yes		Yes
Hungary	Pull; 20-30 sec. To 2-3 min.	Cell ID	Yes	Yes	No
Ireland	Pull	Cell ID	No	Yes	Yes
Italy	Push in Salerno prov. Only	Cell ID	Yes	Yes	Yes
Latvia	Pull; avg. 10.3 sec; win 1 min. 98.17%	Cell ID/Sector ID	Yes	No	No
Lithuania	Pull in Vilnius PSAP; 1.5-10 sec.	Cell ID	Yes		Poss. in 1 network
Luxembourg	Push	Cell ID	Yes		
Malta	Pull; up to 1 hr.	Cell ID	Yes		Yes if reg'd sub.
Netherlands	Pull on KPN network; <1 sec.	Cell ID; My SOS win 5 meters	Planned	Planned	Yes (not pre-paid)
Poland	Pull; est. avg. 13 sec.	Cell ID/Sector ID; 100m-1 km	Yes	Yes	Yes
Portugal	Push	Cell ID; 100m urban; 30km rural	Yes		No
Romania	Push	Cell ID/Sector ID	Yes	Yes	Yes
Slovakia	Push (Telefonica 02); pull (Orange; Tmobile); avg 2-	Cell ID/Sector ID	Yes	Yes	After 01 Sept. '09

TABLE 2

Attributes of Mobile Caller Location Identification in EU Countries

EU State	Method and Time Needed for Request	Type of Location Information	Int'l Roamer Info	Nat'l Roaming	Reg'd Address Availability
	20 sec; win 1 min. 94.5%				
Slovenia	Push on Mobitel, T-2 & IZI; others pull; 15 min-1hr	Sector ID	Yes	Yes	No
Spain	Push in 15 PSAPs; Pull in 3; avg. 30 sec.	Cell ID/Sector ID	Yes except 5 PSAPs	Yes exc. 4	Yes
Sweden	Pull; avg 3-5 sec.	Cell ID	No	No	Yes
United Kingdom	Pull; max. 2 sec.	Cell ID	No	N/A	Yes (except pre-paid)

Source: European Commission *COCOM Survey*; IDC Canada, 2009

Type and accuracy of mobile caller location

Most EU Member States indicated mobile network Cell ID or Sector ID as the available mobile caller location information. This type of caller location currently appears to be the 'technically feasible' minimum caller location information within the meaning of Article 26(3) of the Universal Service Directive, which all mobile operators within the EU should be able to provide. In order to be understandable and usable by the emergency services it must obviously be possible to link the Cell ID/Sector ID to a particular geographical area on a map, and appropriate technical arrangements should exist in the Member States for this purpose. However, much more accurate location technologies do exist and are being considered.

The accuracy of mobile caller location in the case of Cell ID/Sector ID depends on the mobile cell or sector coverage that varies between urban and rural areas. The second questionnaire therefore invited the Member States to indicate the availability of any 'enhanced' mobile location technologies that allow for better results than Cell ID/Sector ID.

24 Member States reported Cell ID/Sector ID as the available mobile caller location information. Among those countries, Poland, Finland, Sweden and the United Kingdom indicated the existence of additional facilities to increase accuracy of mobile caller location, based on measurements and calculations ('timing advance information') and the Netherlands reported on the availability of a special 112 service for disabled users, which transmits GPS coordinates. As for other countries, the Czech Republic uses area and Best Server Base Transceiver Station ID, Estonia reported 'coordinates' as the available caller location information while in France the mobile caller location is the relevant postal code.

At the moment, caller location information is not provided for mobile calls made in six EU Member States. In some cases the technology of the existing communications centers is too old to handle location information. In other cases progress is hampered because of incompatibilities between existing and required products (e.g. GIS,

localization techniques). The problem seems to concern mostly the infrastructure of the emergency services rather than the capability of operators to transfer location data. In 2002, the EC requested the European Telecommunications Standards Institute (ETSI) to develop a common interface between operators and emergency services to facilitate the transmission of localization data, but this work has not yet been completed. Since 2005, the Commission has launched several actions in the field of caller localization.

Possibility to obtain registered address of mobile subscribers

Several Member States indicated that in their countries PSAPs can also obtain the address information corresponding to the mobile subscription. This is a useful additional facility, especially in the light of the fact that more customers have given up their fixed lines and rely solely on mobile telephones also at home, thus increasing the chance that the mobile customer's registered home address is also the place from which the 112 call is being made.

17 Member States reported that it was possible for PSAPs to obtain the address of the mobile subscription. In addition, Slovakia is planning to introduce such a facility in 2009 and Lithuania reported that it was available for customers of one mobile network. Some 13 Member States (including Malta, the Netherlands, Austria and the United Kingdom) drew attention to the fact that the registered address may not be available for all mobile users (such as pre-paid mobile users who are not required to register).

The European Commission recognizes the limitations of cell sector ID location techniques and is committed to promoting improved location accuracy technology throughout the EU.

Mobile caller location in case of roaming (international and national)

Finally, Member States were invited to indicate whether caller location information is provided for calls made by the users of international mobile roaming services and domestic mobile subscribers in the situation of national roaming, if such facility is available.

23 Member States reported that caller location is possible for users of international mobile roaming services. Four countries – Ireland, the Netherlands, Sweden and the United Kingdom - replied that caller location was not possible; the Netherlands and Sweden indicated that they are considering the introduction of such a facility. In addition, in Spain this facility is not available to some PSAPs.

Out of the 19 Member States offer national roaming, 14 reported that caller location is possible. Caller location is not provided for such mobile users in five countries – Belgium, Latvia, the Netherlands, Finland and Sweden; the Netherlands and Sweden are considering the introduction of such a facility. In addition, this facility is not available in some PSAPs in Spain.

Availability of 112 when out of coverage of home mobile network

The possibility for domestic mobile users to access 112 when they are out of their home network coverage by using another available domestic mobile network, which may be referred to as national 'emergency roaming', can be particularly relevant in areas of the national territory with limited mobile network coverage, for example, in areas where only one of a country's several mobile network providers has rolled out its network.

25 Member States confirmed that such national emergency roaming is available. The only exception is the United Kingdom, which indicated that discussions have started on the introduction of this facility, while Belgium reported that this facility is currently only available on two of the three available national mobile networks. In addition, Estonia specified that the user must first remove the SIM card to benefit from this facility. In contrast, Cyprus and Romania, which provided negative replies on this issue during the first data gathering round, now report having enabled national emergency roaming.

EU Member States were also invited to indicate how national emergency roaming is achieved, in particular whether it is a consequence of allowing SIM-less 112 calls in general or a consequence of specific obligations placed upon or arrangements made between mobile operators. SIM-less 112 calls were reported possible in 21 Member States, the remaining six being Belgium, France, Cyprus, Romania, Slovenia and the United Kingdom. However, Germany indicated that SIM-less calls will be disabled after the second half of 2009.

Vehicular 112 eCall Standards

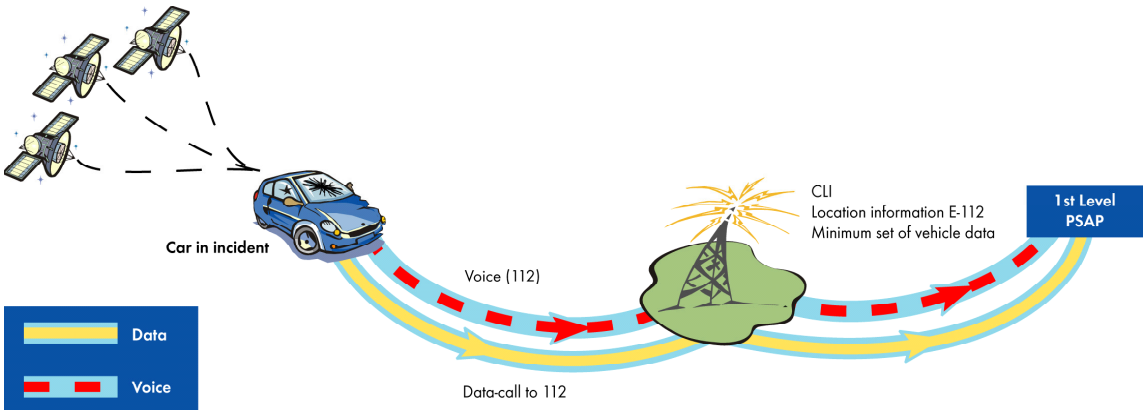
The EU has moved ahead of North America in embracing a new system that will allow all vehicles in Europe to make an automatic 112 emergency call with relevant data about an accident or major incident. Dubbed eCall, the interoperable in-vehicle emergency call service is envisioned to be introduced and operated across Europe on all new vehicles in 2010.

The EU has moved ahead of North America in embracing a new system that will allow all vehicles in Europe to make automatic emergency calls.

In the event of a vehicle collision, the eCall in-band modem is used in an automatically or manually established emergency voice E112 call from the vehicle (IVS) via the cellular network to the local emergency agency's PSAP. The eCall modem allows to transfer a data message from the IVS over the cellular network to the PSAP which is denoted as eCall MSD illustrated in Figure 5.

FIGURE 5

European Vehicular eCall System Overview



Source: 3GPP 3rd Generation Partnership Project; IDC Canada, 2009

It is expected that the eCall MSD information will be sent either immediately following the establishment of the voice call or at any point later during the voice call. The integrity of the eCall data sent from the vehicle to the PSAP is ensured by the specified modem. The MSD can include vehicle location information, time stamp, number of passengers, the Vehicle Identification Number (VIN), and other relevant accident information.

The eCall system is similar to the 911 Assist service recently introduced by **Ford Motor Co.** 911 Assist, part of an upgrade to Ford's exclusive **Microsoft** SYNC system, will place a call directly to a local 911 emergency operator in the event of an accident involving either an airbag deployment or fuel shutoff. In a situation when an occupant cannot respond, SYNC plays a recorded message to the 911 service and alerts an operator that a crash has occurred.

Unlike other crash notification services, 911 Assist does not require the customer to sign up and pay for a costly monthly service subscription; SYNC uses a customer's existing mobile phone. The system is ready when a cell phone is properly paired, turned on and connected to SYNC - designed to occur every time the driver enters the vehicle with their cell phone. A key advantage of the system is speed, since calls are placed directly to the nearest local 911 operator — not a third party call center. (See: Ford Motor Co., *News Release*, "911 Assist," Dearborn, MI: May 20, 2009.)

In Europe, the EC has brought together standardization bodies, the automotive industry, mobile telecommunication industry, public emergency authorities and others in the eSafety Forum initiative which has identified high-level requirements, recommendations and guidelines for the pan-European eCall service. The eSafety Forum assigned ETSI to standardize those parts of the eCall service that affect the mobile communication system and the development of the eCall standard was further delegated to the 3rd Generation Partnership Project (3GPP). That work was completed in March 2009 and presented for formal approval as a European regional requirement by the European standards organization. (See: 3rd Generation

Partnership Project. *Technical Specification*, "eCall Data Transfer; In-band modem solution; General description (Release 8)," Valbonne, France: March 2009.)

Emilio Davila Gonzalez, the European Commission project officer for ICT for Transport, welcomed the completion of the work, stating: "This will now allow stakeholders to start testing equipment. Vehicle manufacturers, suppliers and the public safety authorities can now start introducing eCall functionality in Europe."

Work on conformance test definition and performance characterisation is ongoing, with both expected to be complete by September 2009. http://www.3gpp.org/eCall

The E911 initiatives in the United States and E112 initiative in Europe are being implemented in strikingly different ways yet both require wireless carriers to be able to inform emergency services of any caller's location using high accuracy technology.

Canada

The preceding discussion underscores how far behind Canadian efforts at implementing wireless E911 has lagged emergency enhanced wireless service developments in both the United States and Europe.

The federal government allowed the affected parties to cooperate and develop a workable solution with very little regulatory intervention from the Canadian Radio-television and Telecommunications Commission (CRTC). In the mid-1990s when the magnitude of the problem first became apparent in Canada, the only institutional arenas through which concerns could be articulated were the provincial '911 Advisory Boards.' Several prominent members of the Canadian PSAP community urged the Canadian Wireless Telecommunications Association (CWTA), the trade association responsible for advancing the interests of the Canadian cellular industry, to take the lead and establish a national forum to review the technical, operational and regulatory implications of integrating wireless 911 into the existing wireline 911 infrastructure.

The CRTC (the federal communications regulator, which has responsibility for carrier adoption of 911 technologies in Canada) tasked an E911 Working Group of its Interconnection Steering Committee in 1997 to work on the issue under the auspices of the CWTA. This group includes membership from the major cellular providers in Canada (**Bell Mobility**, **Telus Mobility** and **Rogers Wireless**), and key representatives of the PSAP community including the York Region and Metro Toronto police departments and cities of Calgary and Montréal.

As a result, the process has proceeded more deliberately in Canada through a series of trials (conducted in Alberta and Ontario) coordinated by the CWTA. The CRTC mandated all Canadian wireless service providers (WSPs) to implement Phase 1 of wireless E911 service in 2003. (See: Canada. Canadian Radio-Television and Telecommunications Commission. *CRTC Telecom Decision 2003-53*, "Conditions of service for wireless competitive local exchange carriers and for emergency services offered by wireless service providers," Ottawa: August 12, 2003.)

Earlier this year, the CRTC issued an important decision on implementing the second phase of wireless E911 by February 2010. (Canada. Canadian Radio-Television and

Telecommunications Commission. *CRTC Telecom Regulatory Policy 2009-40*, "Implementation of wireless Phase II E911 service," Ottawa: February 2, 2009.)

However, the CRTC's Phase II E911 policy currently provides Canadians with significantly fewer features than U.S. wireless users currently have access to. That is because the commission has opted to deploy wireless Phase II E911 features in two stages:

- Stage 1 will provide X,Y coordinate information and location parameters to PSAPs use to determine a caller's location by February 2, 2010.
- Stage 2 has deferred providing wireless Phase II E911 location coordinates of roamers and unsubscribed (or pre-paid) handsets, plus mid-call location updates, to an unspecified time frame.

The CRTC directed the ESWG to file a report within six months of the February 2009 decision on its findings regarding the deployment of wireless Phase II, Stage 2 E911 features. Upon review of that report, the Commission stated it will specify the Stage 2 implementation requirements and time frames.

Thus two key functions available to U.S. E911 PSAP users have not been required in the CRTC's Phase 2 wireless E911 policy. The implementation of five other E911 functions that are available in the United States are yet to be fully determined by the CRTC.

Roaming: The recent CRTC policy did not establish a requirement to provide location information for subscribers of other companies that roam on their service. The issue of whether roaming subscribers will be able to accept wireless 911 service in Canada has been delayed to the unspecified Stage 2 implementation timeframe.

Mid-Call Location Updates ("rebids"): In Canada, the question of whether mid-call location updating will be available has also been delayed to the unspecified Stage 2 implementation timeframe.

Unsubscribed Handsets: The CRTC policy establishes no such requirement to provide location information for 911 calls made on unsubscribed (or pre-paid) handsets in Canada. This issue has also been delayed to the unspecified Stage 2 timeframe.

Accuracy: The CRTC has noted the general levels of location accuracy available with location equipment on the market (10-300 metres), but it has not prescribed any precise requirements for location accuracy. The CRTC also did not mandate testing of accuracy levels.

Compliance Measurement Areas: There is no geographic or other compliance measurement area standard in Canada.

Roll-out Schedule: In Canada, wireless providers must roll out the E911 functions prescribed by the CRTC by 2 February 2010 wherever wireline E911 is available. However, no schedule has been established for the Stage 2 rollout. The interim rollout schedule for the period ending on February 2, 2010 is to be determined by the

CISC Emergency Service Working Group. The Stage 2 rollout schedule is unspecified.

Reporting: No E911 deployment reporting requirements have been imposed in Canada and there are no provisions for fining a WSP for non-compliance.

Views of Select Canadian Public Safety and PSAP Officials

Importance of Wireless E911 and Adequacy of GPS-based Location Finding

"The world of communications is definitely changing and wireless 911 has caused us some concern, as well as become of much more interest in the world of policing," said William Blair, Chief of the Toronto Police Service.

The new features inherent in Phase wireless E911 "are critical must-haves," said Vera Danyluk, Mayor of Ville de Mont-Royal, Que., and Vice Chair of the Public Security Commission of the Agglomeration Council of Montréal.

This need for public safety organizations to know the location of emergency wireless callers will become even more important in the future. "Fewer people have fixed phones today and I believe wireline communications will become an exception in the near future," said Richard Finn, Superintendent and Officer-in-Charge of Information Services for York Regional Police. "So the need to locate callers with a reasonable degree of accuracy will be even more critical because of wireless substitution."

"Wireline communications will become an exception in the near future." - Richard Finn, Superintendent and Officer-in-Charge of Information Services, York Regional Police.

But some public safety communication experts caution that wireless E911 technology is not a panacea for every case.

Although Phase 2 wireless E911 location technology can provide exceptional geographic accuracy within 50 metres or less, it does not provide altitude or height information, said Ken Shymanski, President & CEO of Vancouver-based Ecomm911. This is of particular impact in urban core areas, including high-rises and underground areas. "E911 data can't tell us if a wireless caller is on the 1st or 30th floor of a high rise condo which means a combination of network-based triangulation with GPS-enabled devices is essential," Mr. Shymanski said. And he added "members of the public still need to be aware of their location." (However, there are network-based solutions that will provide accurate in-building and urban locations where A-GPS locations fail.)

Curtis Brochu, Manager, Public Safety Communications for The City of Calgary also points to the little-known issue of lag-time with wireless text messages. Text messages are sent on a 'best-efforts' basis and a lag time can be as much as 15 minutes before a message is forwarded to a recipient. "People assume that all of these communications are instantaneous. But that is not necessarily the case," Mr. Brochu said.

Adequacy of CRTC Regulatory Policy on Implementing Wireless E911 in Canada

"If this policy is a one-shot deal then it won't be enough."
- Curtis Brochu, Manager, Public Safety Communications, The City of Calgary.

"The phase 2 wireless enhanced 911 services are very significant and long overdue in Canada," said Mr. Brochu. But he adds "if this policy is a one-shot deal then it won't be enough."

"North America is one large cell phone market yet we are split politically on issues like public safety," said Mr. Shymanski of Ecomm911. "We need a public safety wireless solution, not a unique made-in-Canada solution."

Awareness of Staged Phase II Wireless E911 in Canada

"The longer the second stage is put off, the more it's a problem for our 911 PSAP centre."
- Vera Danyluk, Mayor, Ville de Mont-Royal, Que.

"The longer the second stage is put off, the more it's a problem for our 911 PSAP centre," said Mayor Danyluk of Ville de Mont-Royal, Que. Currently Vice Chair of the Public Security Commission of the Agglomeration Council of Montréal, Ms Danyluk has worked very closely with Montreal's consolidated 911 centre on public safety communication issues for many years.

"We're grateful the pendulum is finally swinging the other way from the previous deferral mode," said Mr. Brochu. "I'm ok with taking a series of steps if we continue to take more steps. This will be a long journey."

But the prospect of further delay due to the need for more study or analysis "is one area of concern," said Mr. Shymanski.

Deferral of Phase 2 E911 features (roaming, rebids and prepaid coverage)

The provision of wireless E911 to international roamers is of particular importance to Ecomm911 in Southwest British Columbia both because it is a major vacation destination for Alaska-bound cruise ship tours and because of the impending 2010 Winter Olympic Games, says Mr. Shymanski.

Ecomm911 and Telus recently announced they are set to begin a trial of the first stage of the Phase 2 E911 technology in August, with implementation by Jan. 18, 2010, in time for the Vancouver Winter Olympic Games. However, provision of location data for international roamers, pre-paid customers and rebid data from users who are mobile will have to wait until the as-yet-undetermined later second stage of Phase 2. (See: Emergency Communications for Southwest British Columbia Inc., *News Release & Backgrounder*, "Cell phones to provide caller location to regional 9-1-1 centre," Vancouver: June 25, 2009.)

Rebid is an essential feature that relates to the essence of a mobile device, said Mr. Brochu of The City of Calgary. "It's about knowing where people are, not where they were."

The popularity of pre-paid services among lower-income Canadians means the deferral of location determination for these wireless users also has social policy implications, said Pam McConnell, Toronto City Councillor and Vice Chair of the Toronto Police Services Board.

The head of Montreal's consolidated 911 centre recently told Ms Danyluk that the new features associated with Phase 2 wireless E911 "are needed 'ASAP.'"

Timeline for Deployment of Stage 2 Wireless Phase II E911 Features

Several public safety officials we contacted decried the lack of precise idates by the CRTC for implementing the second stage of Phase 2 E911 services. "We would have liked a requirement to implement these services within 18 months," said Mr. Shymanski of Ecomm911.

The CRTC should take a more proactive role to ensure subsequent steps are implemented "on an ongoing, steady basis," said Mr. Brochu in Calgary.

Need for CRTC To Specify Performance Standards and Reporting

"Setting performance metrics is crucial," says Mr. Brochu. "If you're not tracking performance then you are not going to identify problems." And he adds tracking the accuracy performance of emergency location data from wireless providers must go hand-in-hand with a requirement to report those metrics.

"Setting performance metrics is crucial."
- Curtis Brochu, Manager of Public Safety Communications at The City of Calgary.

Mr. Shymanski of Ecomm911 notes there are rigid standards for landline 911 in Canada but not for wireless 911 services. He advocates the need for a public body such as the CRTC to establish those metrics including a target to answer 95 per cent of all 911 calls within 5 seconds.

Richard Finn, Superintendent and Officer-in-Charge of Information Services at York Regional Police, said he would like to see the CRTC issue a report on wireless 911 response and accuracy rates at least once a year. "Without metrics, how do we know what we've achieved?" he asks.

However, such standards must also take into accounts the geographic vagaries of local areas across Canada, says Mayor Danyluk of Ville de Mont-Royal, Que.

Standards must also take into accounts the geographic vagaries of local areas across Canada.
- Vera Danyluk, Mayor, Ville de Mont-Royal, Que.

Policy

There is a widely recognized need among the Canadian public safety community for the CRTC to take a definitive leadership role on setting national wireless E911 policies and performance-based standards.

"The CRTC is the right body for this issue because of their jurisdiction over the telecom carriers and this is a good start," said Mr. Brochu. "But there will need to be further directions to the wireless industry with insistent timelines to achieve the next steps."

To that end, Mr. Shymanski at Ecomm911 said he plans to organize a meeting of top Canadian 911 officials to discuss this need and to lobby the CRTC on 911 policy-related matters.

Our discussions with municipal officials in Toronto, Montreal and Calgary found a high level of support for this idea.

Financing Issues

PSAPs believe that the fundamental issue of identifying mechanisms and processes for funding deployment costs of enhanced wireless location services must be worked out between the CRTC and wireless providers.

The Canadian wireless sector is well equipped to recoup their E911 associated costs. Based on publicly available data and the monthly 911 user fees collected from each subscriber, the main wireless providers collected more than C$165 million a year to provide 911 service in Canada at the end of 2008 (see Table 3).

TABLE 3

Canadian Wireless Carrier 911 Revenue, 2008

Carrier	Subscribers at Year-end	Monthly 911 fee C$	Annual 911 Revenue C$M
Bell Mobility	6,497,000	$0.75	$58.47
MTS Mobility	434,776	$0.50	$2.6
Rogers Wireless	7,942,000	$0.50	$47.6
SaskTel Mobility	452,218	$0.21	$1.1
Telus Mobility	6,129,200	$0.75	$55.2
Total	***21,455,194***	***$0.54 average***	***$165***

Source: Canadian Wireless Telecommunications Association; Emergency Services Working Group; and IDC Canada, 2009

Yet most consumers who are also municipal rate payers don't even know this money is collected. The City of Calgary regularly conducts surveys of callers to its 911 centre. More than four-fifths (or 86%) of 911 cell phone callers said they did not know this charge was collected, said Curtis Brochu, Manager of Public Safety Communications at The City of Calgary.

However, there is no regulatory or policy requirement that mandates the revenue from the 911 fees collected to be spent on wireless 911 technology and services or directly earmarked to PSAPs in a company's service areas. In the absence of such a rule, Mayor Danyluk points to the model agreement between Quebec municipalities and Bell Canada as a useful starting point under which the phone company remits 911 revenue to the municipality to defray their 911 costs. (See: L'Union des Municipalités du Québec and Bell Canada, "Convention relative à la perception et à la gestion des coûts municipaux du service 911" [agreement respecting collection and management of municipal costs of the 911 service].)

"We need a strong federal 911 strategy that marries policy with funding relief," said Mr. Shymanski, pointing to the model of the U.S. Department of Homeland Security.

"We need a strong federal 911 strategy that marries policy with funding relief." - Ken Shymanski, President & CEO of Ecomm911

Impact of Next-Generation Wireless Networks

In the short-term, the CRTC's staged implementation is "not totally acceptable," said Sup't Richard Finn at York Regional Police.

However, in the longer term he notes that new wireless network technologies may result in dramatic improvements in the provision of location-based information. All major wireless carriers in Canada will undergo a major upgrade to fourth-generation LTE networks in the 2010-2012 period, Mr. Finn notes. For example, Bell and Telus

began building a joint LTE network last fall. (See also: Lawrence Surtees, "Telus & Bell Join Forces For Wireless Migration to HSPA & 4G LTE Network," *IDC Link*, lcCA21465908 (October 10, 2008) "LTE is an end-to-end wireless IP network which will make it much easier and cheaper for carriers to provide the kind of precise location information that is needed," said Mr. Finn.

He believes LTE wireless network technology will make it easier to solve the twin problems of providing locations of wireless roamers and pre-paid users.

LTE network technology will make it easier to solve the twin problems of providing locations of wireless roamers and pre-paid users.
- Richard Finn, Sup't and Officer In Charge of Information Systems, York Regional Police

His opinion is shared by three of the largest public safety communication organizations in the United States. The Association of Public-Safety Communications Officials (APCO) and the National Emergency Number Association (NENA) issued a joint press release in May 2009 endorsing LTE as the technology of choice for all regional PSAP systems. This was followed by an endorsement of LTE by the National Public Safety Telecommunications Council (NPSTC). All parties recognize that LTE is some time off in the future and that decisions need to address today's networks.

CONCLUSION

The U.S. FCC has been actively engaged in developing and promoting location-based wireless E911 emergency services from the outset and its process to implement wireless E911 has been legalistic. E911 initiatives in the United States and the continent-wide E112 initiative in Europe are being implemented in strikingly different ways yet both require wireless carriers to be able to inform emergency services of any caller's location in an accurate manner. Both efforts underscore the challenges for Canada to set effective policies to implement the technologies and features of Phase 2 wireless E911.

Although the CRTC's Phase 2 regulatory policy issued in February 2009 is seen by the public safety community as a positive first step, much more work remains to be done to improve upon the first stage and implement the second stage of wireless E911 services. This work is required to allow for the provision of effective location-based emergency dispatch services to wireless users by Canadian PSAPs. The issue becomes increasingly significant as wireless communications becomes the preferred method of communication by more Canadians.

In the long term, there is a widely recognized need among the Canadian public safety community for the CRTC to take the lead to establish national wireless E911 policies and standards for the public safety community.

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DEFINITIONS

A-GPS: Assisted Geographic Positioning System

ALI: Automatic Location Identification

ANI: Automatic Number Identification

APCO: Association of Public-Safety Communications Officials - Intl, Inc.

CAMA: Centralized Automatic Message Accounting

CAD: Computer Aided Dispatch

CFR (US): Code of Federal Regulations

CISC: CRTC Interconnection Steering Committee

CRTC: Canadian Radio television and Telecommunications Commission

CWTA: Canadian Wireless Telecommunications Association

E2: Emergency service protocol standard (J STD 036 B)

EC: European Commission

ECall: In-vehicle emergency call service envisioned to be introduced and operated across Europe in 2010.

ESIF: Emergency Services Interconnection Forum

ESRD: Emergency Services Routing Digit

ESWG: CISC Emergency Services Working Group

E9-1-1: Enhanced 9-1-1

ETSI: European Telecommunications Standards Institute

EU: European Union

FCC (U.S.): Federal Communications Commission

GPS: Geographic Positioning System

HSDPA (High Speed Downlink Packet Access): Modulation method based on advanced W-CDMA technology for downlink peak data rate of 10 Mbps. Standardised as part of 3GPP Release 5.

ILEC: Incumbent Local Exchange Carrier

IP: Internet Protocol-Based technology

LBS: Location Based Services

LTE (Long-Term Evolution): Fourth generation wireless standard.

MLP: Mobile Location Protocol standard (OMA LIF MLP V3_1 20040316 C)

MLS: Mobile Location Server

MPC: Mobile Positioning Center

MSAG: Master Street Address Guide

MSD: Minimum Set of Data

NAVSTAR GPS: Navigation Satellite Timing and Ranging GPS; global constellation of GPS satellites operated by the U.S. Department of Defence

NENA: National Emergency Number Association

NG9-1-1: Next Generation 9-1-1 System

NPSTC: National Public Safety Telecommunications Council

PDE: Position Determination Equipment

PSAP: Public Safety Answering Point

PSTN: Public Switched Telephone Network

3GPP: 3rd Generation Partnership Project; Regional forum that sets European wireless standards.

VoIP: Voice over Internet Protocol

WCPS Act (U.S.): Wireless Communications and Public Safety Act (1999)

WGS 84: World Geodetic System 1984; global geocentric reference model that provides map projection datum used with the MLP standard to provide X, Y geographic map coordinates.

Wireless Services: Telecommunications services via the airwaves using radio, cellular, satellite, microwave and other radio frequency transmission systems including fixed wireless.

WSP: Wireless Service Provider

X, Y: Geographic map coordinates in decimals degrees format similar to latitude/longitude.

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