

Mobile SMS and Data Roaming Explained



Mobile SMS and data roaming explained



Roaming is the ability of customers to use their mobile phones or other mobile devices outside the geographical coverage area provided by their normal network operator. When customers travel abroad and use their phones or laptops whilst on a foreign ("visited") network, this is known as international roaming.

Sending and receiving SMS text messages whilst roaming abroad is called SMS roaming. Data roaming refers to the use of mobile data services whilst abroad. The most common mobile data roaming services are:

- *MMS: Exchanging rich multimedia messages while abroad with other customers on GSM/3G networks at home or abroad.*
- *Push e-mail: Reading and replying to e-mails while abroad, automatically 'pushed' to mobile devices such as BlackBerries, personal digital assistants and sophisticated mobile phones.*
- *Handset internet: Using mobile devices to access internet services such as Web pages, Web 2.0 applications, music downloads and video streaming whilst abroad.*
- *Mobile broadband: Connecting laptops via data cards or USB dongles to the internet to provide access to common applications such as e-mail, Web browsers and company networks whilst abroad.*

The usage of mobile data services is typically measured in kilobytes (KB) and megabytes (MB), which refers to the volume of data transmitted for the service used. An e-mail without an attachment is typically between 1 and 50KB; an average web page can use several 100KBs or even more depending on the number of graphical elements; and a downloaded song usually consumes 2 to 5MBs of data, depending on quality and length.

Clearly, the traffic volumes involved in one typical day of data roaming can vary significantly depending on the type and usage intensity of the different data services.

Sending or receiving MMS or push e-mail typically uses several 10KBs per day unless large files are attached. Surfing the internet on a handset can incur data volumes of a few 100KBs per day, but can also require several MBs if rich multimedia content such as MP3 songs and video streams are downloaded. Mobile broadband volumes can quickly exceed 10MBs, as laptop-based applications such as downloading presentations, pictures, music and videos are typically very data-intensive.

As a result of the trend towards higher volumes of data downloaded, operators have introduced innovative tariff packages, including flat rate daily bundles, which deliver much lower prices per MB downloaded than were previously available.

What tariffs for SMS and data roaming do operators offer?

Operators offer a wide variety of data roaming tariffs catering for different data services and needs. Customers should get to know the array of tariffs available on the market in order to select the package that best suits their needs. Most tariffs fall into one of the categories shown in the following table:

Type of tariff	Description	General suitability
Standard roaming tariff	The default tariff a customer would use if he has not activated a specific roaming tariff option. In this case, customers are typically charged according to how many SMS or MMS they have sent or how much data they have downloaded or uploaded	These tariffs are typically best suited for occasional roaming with low volume usage
Special roaming tariff	For a fixed fee (typically monthly) the customer gets a lower data roaming tariff (increasingly combined with domestic data tariffs)	These tariffs are aimed at regular use with low to average volume usage
Daily roaming bundles	A fee for a single day of data roaming, which allows data roaming, up to a specified data usage limit, for a fixed fee	These tariffs are ideal for the occasional roamer with a high data volume requirement on particular days from time to time
Monthly roaming bundles	A fixed monthly fee, which includes a certain amount of data that can be used within each month while roaming	A regular roamer with high data volumes would typically subscribe to such a tariff

Tariffs can be identical for all data services or different for the various data services. Some operators, for example, offer daily roaming bundles for laptop connectivity and monthly bundles for push e-mail roaming. For SMS, most operators do not charge for receiving an SMS while roaming, in much the same way as there is usually no charge for receiving an SMS at home.

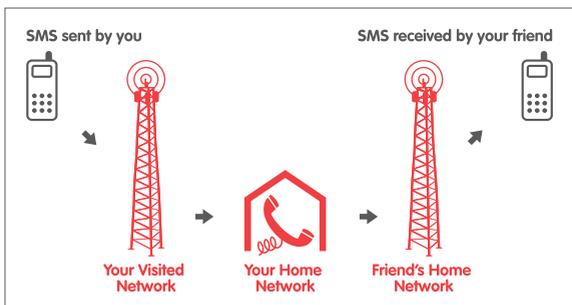
How does SMS and data roaming work?

SMS and data roaming build upon the same principles used to enable voice roaming. When you travel abroad and you turn your handset or laptop on, it attempts to communicate with a GSM or 3G network. Your handset may be preconfigured to actively choose a preferred network in the visited country, but you can choose your own preferred network via the handset menu.

The visited (local) network picks up the signal from your device, notes that you are a visitor and attempts to identify your home network. If there is a data roaming agreement between your home network and the visited network abroad and your network operator allows you to roam, your device will then be able to access data roaming services. In some cases, the visited network may only offer basic data services such as SMS and GPRS-enabled services, such as e-mail, but not 3G/mobile broadband services (e.g. if the visited operator has not rolled out a 3G network or if the home and visited operators have not yet signed a 3G roaming agreement).

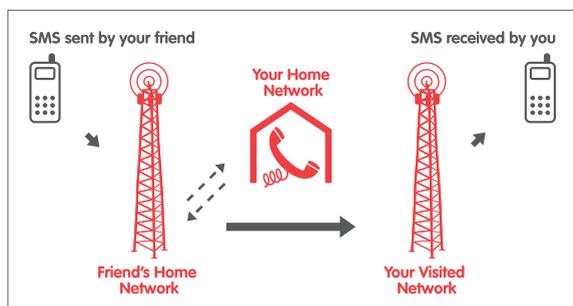
What happens when you send an SMS while abroad?

- When you are abroad and you send an SMS home to a friend, your SMS is managed by the visited operator's network as well as by your home operator's network.
- The visited network passes the SMS via dedicated signalling links to your home network.
- Your home network sends the SMS to your friend's network, which delivers it to your friend's mobile phone.



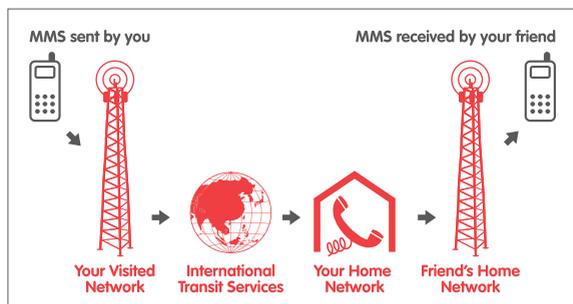
What happens when you receive an SMS while abroad?

- A friend sends an SMS to your mobile phone while you are roaming.
- His operator's network contacts your home network to find out where you are, and then routes the SMS to the network you are roaming on in the visited country.
- The visited network delivers your friend's SMS to your mobile phone.



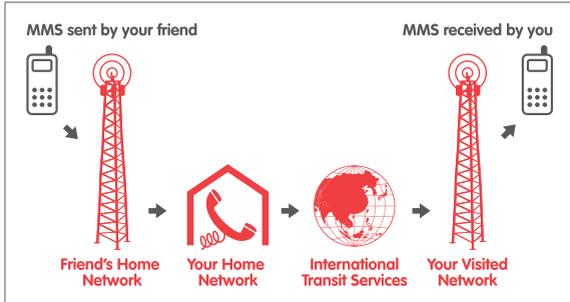
What happens when you send an MMS while abroad?

- When abroad and sending an MMS home to a friend, your MMS is managed by the visited operator's network as well as by your home operator's network.
- The visited network passes the MMS via international data transit (typically an international cable owned by a third party) to your home network.
- Your home network sends the MMS to your friend's network, which delivers it to your friend's mobile phone.



What happens when you receive an MMS while abroad?

- A friend sends an MMS to your mobile phone while you are roaming. His operator's network routes the MMS via international data transit to your home network.
- Your home network sends an SMS notification to your mobile phone abroad.
- Once your mobile phone has acknowledged the SMS receipt, the MMS is passed from your home network via international data transit to your mobile phone.



What happens when you use the mobile internet abroad?

- When abroad and accessing the mobile internet, including push e-mail, handset internet and mobile broadband services, also called Packet Switched Data (PSD), your connection is established by the visited operator's network back to your home operator's network.
- The visited operator's network passes your internet traffic via international data transit to and from your home network.
- Your home network connects you to the internet, your e-mail account(s) and other data services.



How do network operators exchange billing information for roaming customers?

For all data services (and voice calls), the visited network captures the details of every session in a Call Detail Record (CDR). These record information on the location, sending party, receiving party, time of connection, session duration and size (measured in KB or MB).

The visited network operator then uses these details to calculate the wholesale roaming charge payable by your home network. The data records, including the applicable wholesale charges, will be saved in a Transferred Account Procedure (TAP) file.

TAP files are sent from the visited network to your home network, typically by using the services of a data clearing house. A data clearing house acts as a 'hub' for the distribution of TAP files and provides the home network with services such as reporting to assist the home network in running its roaming business. Your home network then pays the visited network the appropriate wholesale charges.

What is the difference between pre-paid and post-paid roaming?

Roaming for pre-paid customers is a more recent development and involves additional investment by operators. This is because roaming signalling and billing systems are more complex for pre-paid services than they are for post-paid services.

For post-paid roaming, when the user first switches their phone on, the visited network checks in real time whether the home network authenticates the customer and authorises its use abroad. But the data records (CDRs) with the details on each SMS and data session are sent to the home operator with some delay (up to several days).

For pre-paid roaming, in addition to the initial authentication step, the call-related data must be exchanged in real time between the visited network and the home network by using a special platform (called CAMEL – Customized Applications for Mobile networks Enhanced Logic), to prevent the balance of the roaming customer's account from becoming overdrawn.

What are wholesale charges and how do operators set them?

Wholesale charges represent the fees the visited network charges the home network for letting the home network's customers roam on its network.

These inter-operator tariffs (IOTs) are agreed bilaterally between the home and visited network operators. Operators often negotiate competitive incentives, for instance, discounts relating to the volume of traffic passed between operators or lower costs for longer sessions.

Wholesale charges are paid to the visited network by the home network, irrespective of whether the home network recovers any fees from its roaming customers.

Who pays for what?

Selected key elements enabling SMS and data roaming

- *Signalling network: Services which enable the exchange of roaming related signalling traffic between the home network and the visited networks.*
- *Home Location Registers (HLRs): These are databases used to store customers' profiles. Communication between these databases and Visitor Location Registers of the visited network allows roaming to take place.*
- *Visitor Location Registers (VLRs): These are databases used to store information about customers, including those who roam. Communication between these databases and HLRs of the home network allows roaming to take place.*
- *SMS welcome servers: Operators use these computer servers to identify and send SMS messages to roaming customers upon arrival in the visited country.*
- *Traffic management platforms: These services allow operators to determine preferred networks for roaming and manage roaming traffic distribution.*
- *International transit: Every time data is transferred between the visited country and the home country, an international data transit/backbone network is used.*
- *Data clearing house: A third party that acts as a hub for reporting, the exchange of data records (CDRs) and settlement between operators.*

Sending and receiving SMS

When a customer sends an SMS while roaming, the retail price he pays reflects several cost elements: the wholesale charge for using the visited network, costs of handling and routing the roaming SMS back to the home network, costs for sending the SMS to the receiver's network, data clearing house fees, signalling fees between the networks and other costs (e.g. commercial costs, IT costs, prepay checks), the home operator's retail costs and taxes, such as VAT.

Most operators do not charge for receiving an SMS while roaming. The sender of the SMS also only pays the usual price as if the receiving customer were on their home network. Hence mobile operators bear the additional costs of handling the received roaming SMS without charging customers for it.

Sending and receiving MMS

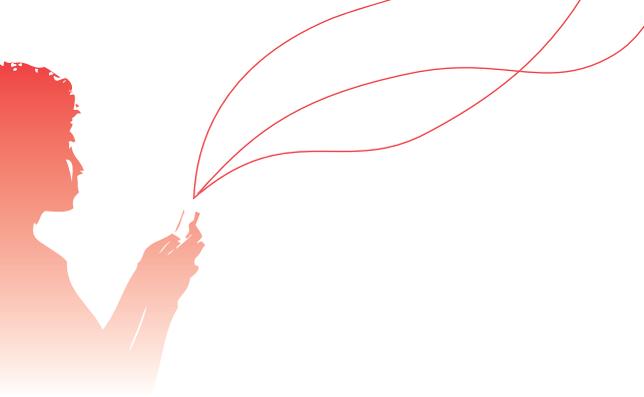
When a customer sends a MMS while roaming, the retail price he pays reflects several elements: the wholesale charge for using the visited network, costs for international transit of the roaming MMS back to the home network, costs for sending the MMS to the receiver's network, data clearing house fees, signalling fees between the networks and other costs (e.g. commercial costs, IT costs, prepay checks), the home operator's retail costs and taxes, such as VAT.

When the roaming customer receives an MMS, the retail price includes the MMS cost plus the cost of an SMS sent to notify the receiving handset that an MMS is ready to be downloaded. Some operators do not charge for receiving an MMS while roaming and therefore bear the costs of delivering the MMS without passing these on to customers.

Using internet data services

When a customer connects to the internet while roaming, for example to receive push e-mail or read the news, the retail price he pays has to cover the following elements: signalling network fees, the wholesale charge for using the data connection on the visited network, costs for the international transit of the data, costs for connecting to the internet from the home network, data clearing house fees, other costs (e.g. commercial costs, IT costs, prepay checks), the home operator's retail costs and taxes, such as VAT.

The usage of internet data services is generally measured by data volume usage, which is highly dependent on the type of device and services used. Checking e-mails, for example, typically uses less data than downloading an MP3 song. The visited network operator, however, has no visibility of what type of data services visiting customers are using and therefore the wholesale price charged to the home operators can only be based on the data volume used per customer.



More information

Common acronyms

- **3G:** *Third Generation mobile network standards. Besides better voice quality, 3G networks allow for faster data transfer than GPRS. 3G is often also called mobile broadband.*
- **CAMEL:** *Customized Applications for Mobile networks Enhanced Logic. It is an Intelligent Network designed to work on either GSM or 3G core networks. CAMEL helps make pre-paid roaming user friendly, with features such as no-prefix dialling, real-time billing and being able to make and receive voice calls, SMS, MMS and use data services while abroad.*
- **CDR:** *Call Detail Record. This is the record of a voice call or an SMS, with details such as origin, destination, duration, time of day, amount charged for each call or SMS. Roaming partners must share CDRs for accurate inter-operator settlement.*
- **GPRS:** *General Packet Radio Service. A packet-based mobile data service, mostly used to access e-mail and the internet from mobile phones. 3G standards are faster alternatives to GPRS.*
- **HLR:** *Home Location Registers. These are databases used to store customers' profiles. Communications between these databases and VLRs of the visited network allows roaming to take place.*
- **IOT:** *Inter Operator Tariff. This is the wholesale fee that the visited network operator charges the home network operators for allowing the roaming customer to make calls or use data services.*
- **IP:** *Internet Protocol. This is the main protocol to enable access to the internet and the Web. It is used in combination with GPRS/3G data transfers.*
- **KB:** *Kilobyte. Measure for the size of data uploads and downloads. One KB equals 1,000 bytes with each byte carrying the equivalent of one single character such as the letter 'A'.*
- **MB:** *Megabyte. Measure for the size of data uploads and downloads. One MB equals 1,000 KB.*
- **MMS:** *Multimedia Messaging Service. This is an extension of SMS, which uses an SMS to notify the mobile device of a new MMS and GPRS or 3G to download the actual message and the included multimedia content.*
- **MO:** *Mobile Originated. Refers to any communication whether voice, messaging or data, that is initiated by a mobile phone.*
- **MT:** *Mobile Terminated. Refers to any communication whether voice, messaging or data, that is terminated on a mobile phone.*
- **MTR:** *Mobile Termination Rate. This is the fee charged by mobile operators to terminate a call on their network.*
- **PSD:** *Packet Switched Data. Describes data services that use a combination of GPRS/3G and IP, such as push e-mail or mobile web browsing.*
- **SMS:** *Short Message Service. Popular service to send short messages (each 160 characters) directly from one mobile phone to another.*
- **TAP:** *Transferred Account Procedure. The TAP is the mechanism by which operators exchange roaming billing information (CDRs). This is how roaming partners are able to bill each other for the use of networks and services through a standard process.*
- **VLR:** *Visiting Location Registers. These are local databases used to temporarily store information about customers, including roaming customers. Communication between these databases and HLRs of the home network allows roaming to take place.*

GSM Facts

About 70,000 new GSM connections are made globally every hour
(Source: Wireless Intelligence 2008)

There are over 3 billion GSM and 3G connections globally
(Source: Wireless Intelligence 2008)

European mobile subscribers

Population of Europe: 500 million (EU27 + Iceland, Liechtenstein, Norway, Source: Eurostat 2007)

Number of SIMs in Europe: 594 million (EU27 + Iceland, Liechtenstein, Norway, Source: Wireless Intelligence 2007)

Where to go for more information

To help mobile phone customers identify and compare data roaming tariffs between operators, the GSMA has set up an independent website with regularly updated tariff information:
www.roaming.gsmeurope.org

For further questions on roaming please contact:

roaming@gsm.org

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