



Global Crossing Carrier Rings

London Carrier Ring & ipLCR
Frankfurt Carrier Ring

What are Global Crossing's "Carrier Ring" services?

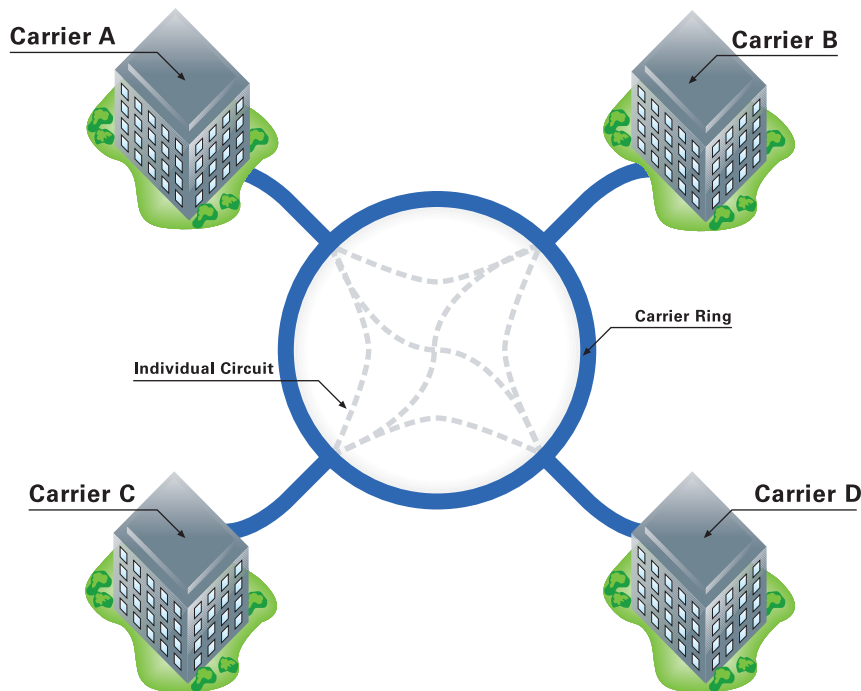
Global Crossing's London and Frankfurt Carrier Ring services provide wholesale purchasers of interconnect capacity for voice services with a rapidly provisioned, cost-competitive, easy to use, resilient service. The Global Crossing Carrier Ring customer community extends to more than 100 permanently connected operators, exchanging in excess of 30 billion voice minutes per annum. The service is non-intrusive in that Global Crossing does not "switch" or bill the minutes it carries, which in turn keeps operator costs low and maximises their service flexibility. Global Crossing's neutral market position (it neither originates nor terminates voice traffic) ensures the integrity of the business relationship. Originally built to carry TDM traffic only, the service now carries both TDM and VoIP traffic and provides gateway services between both, making the Carrier Rings a natural hub for European voice traffic convergence.

The London Carrier Ring (LCR) and Frankfurt Carrier Ring (FCR) are based on Global Crossing owned and managed metro fibres, overlaid with appropriate SDH, Ethernet and VoIP technologies. Services are presented in all major telehotel facilities in each City and at many major (private) carrier facilities. The TDM services are based upon rapidly provisioned E1 circuits between any two member operators. Requirements for larger capacities (E3, DS3 and STM1) can also be readily accommodated with "High Bandwidth" service options. The London service also features VoIP connectivity (the ipLCR) as well as handling conversion between TDM and VoIP. These services enable operators to respond quickly to customer requirements and technology trends as well as, most importantly, being able to rapidly take advantage of availability of new routes and tariffs, irrespective of technology, in a very competitive market.

Global Crossing goes to great lengths to both support and to foster the growth of business between carriers connected to the service, and membership brings with it complementary invitations to Global Crossing's regular "Carrier Exchange Clubs." These exclusive "speed dating" events are designed to help members market their services to each other.

Carrier Ring

After more than eight years of operation, the Global Crossing Carrier Ring services can justifiably claim to be the home of Europe's most vibrant voice trading community.



The London Carrier Ring

The London Carrier Ring (LCR) metro network extends to all major London telehotel facilities and many private operator premises and boasts around 60 active members*, each of whom enjoys the security of a private SDH network hardwired to their own network facilities. Circuits are most frequently provisioned between nominated ports on each operators class 4 or 5 switches, in support of previously agreed interconnect agreements. Individual circuits are invoiced on a monthly basis and may be "B" end shifted to other members at any time and without charge. Similarly circuit cancellations may be actioned at any time.

All moves, changes and additions are actioned via an Extranet service through which circuit inventories may be managed with precision and ease. Physical circuit provisioning at E1 level is often accomplished in less than 12 hours and is guaranteed within 48 hours. Prices are amongst the most competitive in London. Dedicated to its purpose, the LCR has become THE network upon which to purchase capacity for interconnect purposes.

While circuit availability, lead times, prices and service levels are all attractive, the main benefit to members is the membership itself. LCR members offer a compelling combination of routes and tariffs and membership includes many operators whose routes are not easily accessible from other networks. Of course, most members originate as well as terminate traffic and it is these dual objectives that create the trading community that is the essence of the Carrier Ring concept.

Considering the ease with which interconnects can be established and terminated on the LCR (when compared to the hassle of procuring and managing individual circuits from multiple operators) it is easy to understand why the LCR has become Europe's premier trading hub.

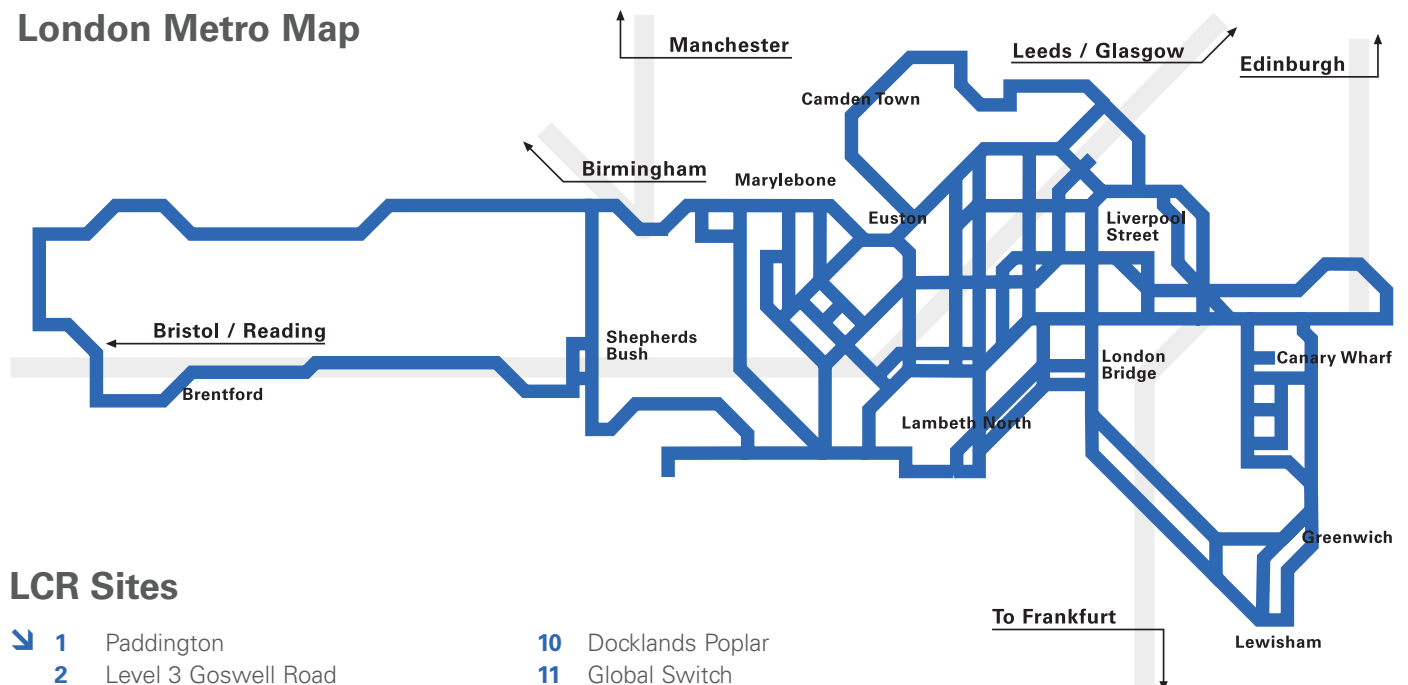
LCR members may upgrade their membership to include ipLCR capability.

The LCR also has an "entry level" membership facility. For those who are unable or unwilling to commit to full membership, Global Crossing offers "Community Membership" of the LCR.

Community Members do not enjoy the dedicated SDH multiplexers and connectivity of full members but instead "share" connectivity into "Community" multiplexers installed in many of the London telehotels. The volume of circuits you require coupled with the number of LCR members you need to connect with will determine whether or not Community Membership is for you. Community Members enjoy the same service levels and connectivity as full members.

Membership term for both Community and Full members is three years.

London Metro Map



LCR Sites

- | | | | | | |
|---|-----------------------|----|---------------------------|----|------------------------|
| 1 | Paddington | 10 | Docklands Poplar | 18 | Redbus Meridian Gate |
| 2 | Level 3 Goswell Road | 11 | Global Switch | 19 | Redbus Sovereign House |
| 3 | IX Europe (City) | 12 | Telehouse Europe (North) | 20 | IX Europe (Heathrow) |
| 4 | Paul Street | 13 | Telehouse 2000 (East) | 21 | Sunguard (Hounslow) |
| 5 | Telehouse Metro | 14 | Telecity Bonnington House | | |
| 6 | City Lifeline | 15 | London Hosting Centre | | |
| 7 | Interxion | 16 | Telecity Harbour Exchange | | |
| 8 | Level 3 Braham Street | 17 | Redbus Harbour Exchange | | |
| 9 | Leman Street | | | | |

The ipLCR

The ipLCR is an extension of the London Carrier Ring and provides a high volume gateway between TDM (SS7) and IP (SIP) traffic. It allows new members with new VoIP services to exchange traffic with current TDM members, as well as allowing current members to convert their TDM traffic to VoIP.

The ipLCR is best considered as a network with two "sides". On one side is the traditional SDH based LCR. On the other side is an Ethernet network. In between the two is the ipLCR gateway, comprising Soft Switches, Media Gateways and Session Border Controllers.

Access to the IP side is via dedicated Ethernet nodes. These are to be found in many of the same telehotels as the existing LCR SDH multiplexers.

As the ipLCR uses Ethernet as an access mechanism, ipLCR members can enjoy extended connectivity to the service everywhere in the country that Global Crossing provides Ethernet coverage via its national Ethersphere service.

The ipLCR has several features.

- ↘ **It allows SDH members to exchange traffic with IP members.**
- ↘ **It allows IP members to exchange traffic with SDH members.**
- ↘ **It allows IP members to exchange traffic with other IP members.**
- ↘ **IP members may use either SIP (preferred) or H.323**
- ↘ **It can provide conversion between SIP and H.323**

It does all of this in a secure, private network community specifically engineered to carry large volumes of high quality voice traffic. It offers an end-to-end quality that IP Transit and traditional peering mechanisms cannot match.

How does it work?

Traffic is converted from SDH (TDM/SS7) to IP (SIP or H.323) or vice versa through Soft Switches, Media Gateways and Session Border Controllers. The Media Gateways respond to called or calling device preference for CODEC choice, and groom IP traffic into E1 trunk groups on the SDH side.

The Soft Switches provide the signalling, routing and call control functionality necessary to ensure appropriate handling of all traffic.

Session Border Controllers protect the infrastructure from attack and guarantee the Ethernet capacity required to carry traffic.

Global Crossing provisions connectivity in 2 Mbps virtual paths on the IP side that are directly mapped on to dedicated E1 trunk groups on the SDH side. End-to-end virtual paths are the "units of trade" on the ipLCR and provide the dedicated connectivity required between the IP and SDH side to support traditional interconnect agreements. They are logically similar to a dedicated E1 on the LCR.

Connectivity on the IP side is provided via 10Mbit, 100Mbit or Gigabit Ethernet ports. Bandwidth is allocated to those ports in units of 2Mbit virtual paths. Bandwidth for the virtual paths is guaranteed by Global Crossing.

Multiple E1's are simply mapped onto larger amounts of bandwidth on the IP side. So 10 E1's destined for the same IP operator, would, for example, be mapped to a 20Mbit virtual path.

The ipLCR provides a secure, low latency environment in which the quality of wholesale interconnects is guaranteed between member operators.

What are the advantages for existing LCR members?

In short – the ipLCR offers new business opportunities:

Current "SDH-only" members with no IP capability: By extending your membership to include the ipLCR, you are able to interconnect with new IP members, and vice versa - without having to invest in your own Soft Switch, Session Border Controller and Media Gateway technologies, or undertake time-consuming and complex interconnect testing with every new interconnect partner: Global Crossing does everything necessary when a member joins the community.

Current members who have already purchased their own Soft Switch and Media Gateway equipment can still benefit significantly by connecting to the ipLCR. Such members will already be using their own Media Gateways to provide connectivity to the LCR or to their TDM switches. These Media Gateways can be disconnected from the LCR and the connectivity and functionality they previously provided replicated by the ipLCR. This service option both lowers existing LCR charges AND frees the Media Gateway ports for other use. It may even free the Media Gateways altogether, resulting in very significant savings in collocation and operational support costs.

What are the advantages for new ipLCR members?

One single VoIP interconnect provides access to an established community of more than 100 operators who actively buy and sell in excess of 30 billion international voice minutes from each other every year.

Membership brings direct and facilitated (via Carrier Exchange Clubs and individual introductions) access to this community.

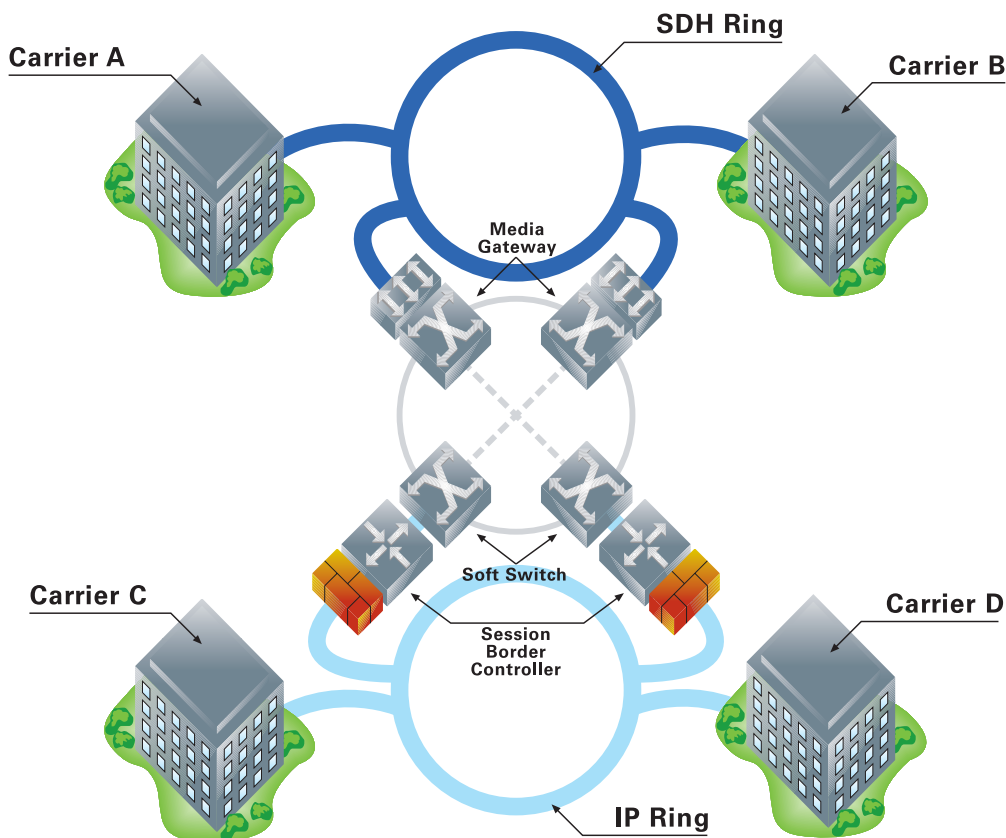
With price differentials between TDM and VoIP traffic normalising rapidly, it makes absolute sense for the interconnect business of the two disparate trading communities to harmonise, standardise and simplify both technically and commercially.

Membership on the ipLCR brings one further key benefit. Establishing interconnects in the VoIP world is often fraught with technical difficulty. The OPEX costs of these difficulties and the inherent time delay and impact on revenues are of great consequence and are well understood by those that face them. Use of the ipLCR minimises these difficulties, as once the initial interconnect has been established, connectivity to any other member, be they SDH or IP is virtually guaranteed, as all IP interconnects are mediated by the ipLCR's Soft Switches, Media Gateways and Session Border Controllers.

Why choose Global Crossing's ipLCR?

- Global Crossing's ipLCR brings all the benefits of the LCR to the VoIP interconnect community. The same low costs, ease of use, scalability, reliability and responsiveness.
- Each customer goes through the process of connecting to the ipLCR - establishing the various parameters for protocols, signalling, CODEC's and so on - only once. From then on, they have assured service to any other member carrier.
- The ipLCR service is non-intrusive. Global Crossing has no commercial interest in the minutes themselves - only the network capacity that carries them.
- If you have not yet invested in VoIP technologies for interconnect, the ipLCR "VoIP enables" your business immediately and without any capital investment or service development cost. It dramatically reduces your time to market and extends your choice of interconnect partners.
- ipLCR call quality is predictable. Calls are secure from hackers and interconnects are established far more cost effectively than over the internet using IP Transit.

ipLCR Carrier Ring



The Frankfurt Carrier Ring

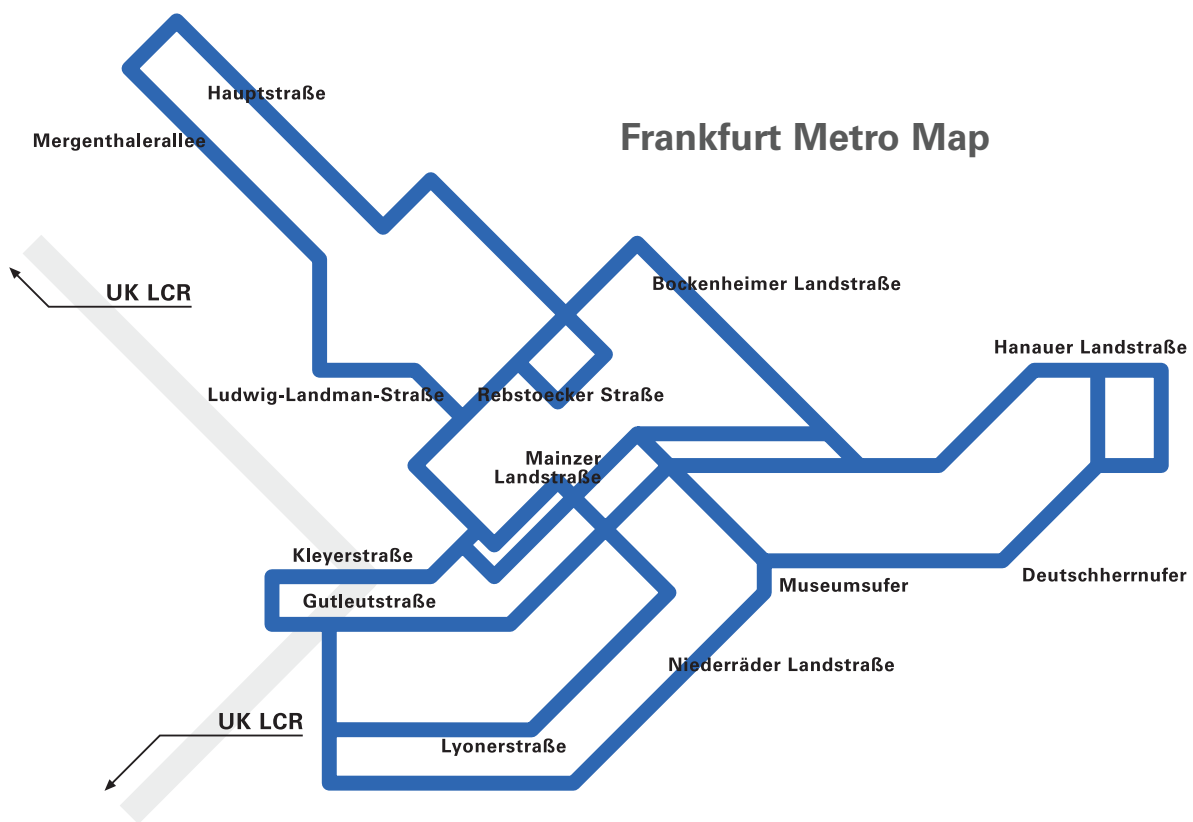
Built to the same commercial and technical model as the London Carrier Ring, Global Crossing's private Frankfurt metropolitan network hosts the Frankfurt Carrier Ring (FCR) service.

Deployed across Frankfurt's leading telehotels and interconnected with Global Crossing's UK based LCR services, the FCR now enjoys more than 50 active members* and has rapidly become the leading service of its type in Germany.

The proven LCR model of rapid provisioning, attractive commercial terms and a private trading community ensures that Frankfurt based operators enjoy the same level of service as their UK peers and colleagues.

The FCR enjoys fully diverse connectivity with the LCR, easing interconnects between the increasing numbers of Central and Western European operators choosing Frankfurt as a hub and their London based interconnect partners.

ipLCR members in London may also interconnect with SDH members in Frankfurt.



FCR Sites

- | | | |
|-------------------------------|------------------------------------|-----------------------------------|
| 1 Kleyerstr. 90 | 7 Kleyerstr. 90 | 13 Lyonerstr. 15 |
| 2 Gutleutstr. 175 | 8 Kleyerstr. 88 | 14 Hanauer Landstraße. 196 |
| 3 Gutleutstr. 310 | 9 Schmidtstr. 51 | 15 Hanauer Landstraße. 320 |
| 4 Kleyerstr. 79-81 | 10 Taubenstr. 7-9 | 16 Weißmüller. 25 |
| 5 Rebstöckerstr. 55 | 11 Hanauer Landstr. 302-304 | 17 Weißmüller. 19-21 |
| 6 Rebstöckerstr. 25-31 | 12 Lyonerstr. 28 | |

Features & Benefits

↘ Any-Any connectivity

SDH ↔ SDH, IP ↔ IP and SDH ↔ IP Connectivity.

↘ TANet NOW

Customers are able to log on to TANet NOW, Global Crossing's private Extranet Service. This provides the ability to place orders, request cancellations and track activity.

↘ Monthly billing

Circuits are allocated and billed on a monthly fixed price basis ensuring you only pay for what you use.

↘ Competitive pricing

Membership system ensures best value.

↘ No install charges for services

Member sites are pre-cabled at the initial installation, allowing circuit activation/deactivation by remote configuration.

↘ Leading interconnect locations

Carrier Ring members enjoy connectivity to the majority of the leading telehubs.

↘ No charge for circuit shifts between members

Saving install costs and reducing paperwork via TANet NOW.

↘ 100+ international operators

The largest trading community in Europe.

↘ National Ethernet Connectivity

ipLCR connectivity available within 25 Km's of any enabled PoP.

↘ Fast service activation

Allows rapid exploitation of fast moving tariffs for international termination. Allows you to maintain lowest possible circuit inventories.

At a glance

Feature	Options	LCR	FCR	ipLCR
Circuit Capacities	E1, STM1	✓		
	E1, E3, DS3, STM1		✓	
	10Mbps, 100Mbps, Gigabit			✓
TDM Signalling	SS7 (ETSI ISUP, UK ISUP)	✓		
	SS7 (ETSI ISUP, German ISUP)		✓	
VoIP Signalling	SIP or H.323			✓
Tail Circuits	PPC, LES, WES and Leased Lines	✓		✓
Interface	G.703, G.957, L1.1/L4.1 (vc12 level)	✓	✓	
	10/100 - RJ45, Gigabit - Optical (GBIC)			✓
Backbone Technologies	SDH	✓	✓	
	Ethernet Layer 2 MPLS over RPR			✓
Availability Target	99.99%	✓	✓	✓
Fault Response Target	4 hours	✓	✓	✓
Fault Restoration Target	8 hours	✓	✓	✓
Circuit Delivery	48 working hours (after initial membership setup)	✓	✓	✓
Support Service	Central support and proactive management 24 x 7 x 365	✓	✓	✓

**Global Crossing**

Rosalind House
Jays Close Viables
Basingstoke
Hampshire
RG22 4BS
United Kingdom

T +44 (0)1256 858685
F +44 (0)1256 858601

www.globalcrossing.com

Global Crossing

Gutleutstr.175
60327 Frankfurt am Main
Germany

T +49 (0)69 238 05 90
F +49 (0)69 238 05 926

www.globalcrossing.com

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