

Schedule 2e

additional terms for Ethernet services

1. SERVICE DESCRIPTION

The Interoute Ethernet Clear and Ethernet Flex Services offer Circuits carrying telecommunications traffic between Network Termination Points on the Interoute Ethernet Network and/ or on the customer's premises.

2. DEFINITIONS

"Burst" means the ability of a Customer to increase the rate of transmission of traffic above the CBR.

"CBR" means Committed Base Rate, the constant rate specified in the Purchase Order up to which Interoute agrees to transmit the customer's Ethernet traffic;

"Circuit" means that part of the end-to-end connection between the Customer premises that is carried on Interoute-owned network equipment monitored and managed by Interoute or carried by **Third Party Access** for the purposes of extending the reach of the service. The Circuit is delineated by Network Termination Points;

"Customer Service Centre" means Interoute's fault management centre, which operates the Interoute Network Management System;

"Eastern Europe" means the region of the Interoute Network including those Interoute Core Ethernet Nodes in Czech Republic, Romania, Hungary, Poland, Bulgaria, and Slovakia.

"EVC" means the Ethernet Virtual Circuit which is the end to end path for Ethernet traffic. The rate of flow of traffic is defined by the CBR and/or Burst;

"Ethernet" means the framing and formatting of data packets to meet the IEEE 802.3 standard.

"Fixed Monthly Charge" means the fixed recurring monthly service charge described in clause 4 of this Schedule, payable by the Customer as set out in the Purchase Order and in accordance with the payment terms of Schedule 1 or, where the Customer is invoiced yearly, 1/12th of the Fixed Annual Charge or where the Customer is invoiced quarterly, 1/3rd of the Fixed Quarterly Charge for applicable Circuit;

"Interoute Core Ethernet Nodes" means a physical facility that is used to accommodate the Ethernet Network and the various Interoute owned Ethernet main routing and switching equipment that comprise the Interoute Ethernet Network;

"Interoute Ethernet Network" means the network owned by Interoute for the purpose of transporting customer generated Ethernet traffic. This includes both core and metro nodes;

"Network Termination Points" means the point at which the Interoute Ethernet service terminates;

"Managed Ethernet" or "Managed Ethernet CPE Option" means the optional Interoute Ethernet product feature which provides performance figures via the Interoute Hub web portal and is implemented using customer premises equipment managed by Interoute;

"Middle East" means the region of the Interoute network including the Interoute Core Ethernet Node in the United Arab Emirates owned by du Telecom.

"Network Distance" means the distance between the Interoute Network Termination Points based on an agreed routing.

"Network Management System" means Interoute's network integrated fault management system;

"Nordic Region" means the region of the Interoute network including those Interoute Core Ethernet Nodes in Sweden, Norway, Denmark and Finland.

"Packet Delivery" means a sampled measure, expressed as a percentage ratio, of the number of test IP packets successfully received at a designated Interoute Core IP Node on the Interoute IP Network.

"Port" means the Customer facing physical presentation point;

"Protected Circuit" means a service configured on ports and across network paths that have sufficient means of switching to an alternate path in order to maintain or restore the service in the event of a service interruption for the Service to be considered by Interoute to be protected. The "Protected Circuit Service Availability" Service Level shall apply to a Service identified as "Protected" in the Purchase Order.

"Round Trip Packet Delay", "RTD" mean the time taken between the first byte being received and the same byte being returned to the same Interoute Core Ethernet node after

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having travelled over the full length of the path between: (i) the Interoute Core Ethernet Nodes or core SDH nodes in relation to the Ethernet service being used by the Customer, or (ii) the CPE in relation to Managed Ethernet on the Interoute network. For the purposes of this Schedule 2e a packet delay shall be deemed to be equivalent to a frame delay.;

“**Service Availability**” is defined in clause 5.2 below.

“**Southern Europe**” means the region of the Interoute network including those Interoute Core Ethernet Nodes in Spain and Italy.

“**Third Party Access**”, “**Third Party Access Circuits**”, “**Leased Lines**”, “**Private Circuits**”, “**Access Circuits**” and “**Access**” mean third party extension circuits that are provisioned between the Customer’s premises and the nearest feasible Interoute Core Ethernet Node.

“**Unprotected Network Distance**” means the total length of the unprotected sections of the Circuit based on an agreed routing. For example, if the Circuit between the Interoute POPs is protected but one of the Third Party Access Circuits is unprotected then the Unprotected Network Distance equals the length of the Third Party Access Circuit which is unprotected. If two unprotected Third Party Access Circuits are used then the Unprotected Network Distance is the sum of both Third Party Access Circuits.

“**Unprotected Circuit**” means a service configured wholly or partly on unprotected ports and/or across an unprotected network path that has no means of switching to either an alternate port or path in order to maintain or restore the service in the event of a Service interruption. The “Unprotected Circuit Service Availability” Service Level shall apply to a Service identified as “Unprotected” in the Purchase Order.

“**USA**” means the region of the Interoute network including those Interoute Core Ethernet Nodes in the United States of America.

“**Western Europe**” means the region of the Interoute network including those Interoute Core Ethernet Nodes in the United Kingdom, Belgium, Luxembourg, Netherlands, Germany, France, Switzerland and Austria.

Any other capitalised terms have the meaning set out in the Schedule 1.

ETHERNET SERVICES TERMS

The following terms and conditions shall apply in addition to Schedule 1 when Interoute provides Ethernet Services to the Customer.

3. CHARGE

3.1. Charges payable by the Customer

Charges for the Ethernet Service shall comprise:

- a. a non-recurring Installation Charge;

and, unless otherwise stated in the Purchase Order, :

- b. a recurring Fixed Monthly Charge based on the CBR; or
- c. a recurring Fixed Monthly based on the CBR with Burst Charges (where applicable) billed on a per Mb (or part thereof) usage rate; or

as specified in the relevant Purchase Order.

- a. Unless otherwise agreed between the Parties in the Purchase Order, Charges for the Ethernet Service and any applicable cancellation charges will be invoiced in accordance with the terms specified in Schedule 1 for the amounts detailed in the Purchase Order or Change Order.
- b. Interoute may charge for provisioning the Circuit beyond the Interoute Network Termination Points.

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- c. Charges for Burst traffic are not included in the recurring fixed Monthly Charges and will be invoiced in arrears; Burst capacity can not exceed the physical port size set out in the Purchase Order.

4. SERVICE CREDITS

Subject to Clause 9 of Schedule 1, Interoute will provide the Customer with service credits, as set out below, for the failure to meet the following service levels:

- a. Service Installation
- b. Service Availability
- c. Time to Repair
- d. Packet Delivery
- e. Round Trip Packet Delay (RTD)

4.1. Service Installation

- a. Interoute will provide a Customer Committed Date for the installation of Circuits. If Interoute fails to meet the Customer Committed Date, the Customer will be entitled to a service credit in accordance with this clause.
- b. If only part of an order is delayed, valid credits will be payable only in respect of Circuits that are not delivered by the Customer Committed Date.
- c. Service credits will be calculated as follows:

For the standard Installation Service Credit

Number of full Working Days by which Interoute fails to meet Customer Committed Date for Circuit:	Service Credits as % of Installation Charge of affected Circuit:
1 to 5 days	10%
6 to 10 days	20%
11 to 20 days	30%
21 days	50%

4.2. Ethernet Circuit Service Availability

4.2.1. General

- a. A Circuit is "Unavailable" when signals cannot be transmitted over the Circuit in one or both directions.
- b. An Ethernet Flex service shall be deemed to be unavailable when signals cannot be transmitted over both Circuits in either or both directions for more than one minute.
- c. An Ethernet Clear service shall be deemed to be unavailable when there are ten (10) consecutive seriously errored seconds.

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- d. The following equation will be used to calculate Service Availability. References to hours are to the number of hours (rounded to nearest hour) in the applicable Monthly Review Period:

$\frac{(\text{Total hours per month} - \text{Total hours unavailable per month})}{\text{Total hours per month}}$	x 100
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4.2.2. Protected Service Availability

- a. Interoute will use reasonable endeavours to ensure that all Protected Circuits are available for 99.95% of the time.
- b. Where Service Availability falls below 99.95% during any Monthly Review Period, the Customer will be entitled to service credits on the applicable Circuit's Monthly Charge as follows:

Service Availability for On-net Services during Monthly Review Period (Protected)	Credits as % of applicable Monthly Charge
<99.95% to 99.5%	5%
99.49% to 99.0%	10%
98.99% to 98.0%	15%
<98%	30%

4.2.3. Unprotected Service Availability

- a. The monthly target Service Availability (A) for Unprotected Circuits having an Unprotected Network Distance (d) of less than or equal to 1000km, will be 99.5%. For Circuits where the Unprotected Network Distance (d) (rounded to the nearest 100km) is greater than 1000km the following equation will derive the monthly target Service Availability :

$$A=100-(d/2000)$$

- b. For example where the Unprotected Network Distance is 2000km the target Service Availability will be 99%.
- c. Where Service Availability falls below 99.5% during any Monthly Review Period, the Customer will be entitled to service credits on the applicable Circuit's Monthly Charge as follows:

Service Availability for On-net services during monthly review period. (Unprotected)	Credits as % of applicable Monthly Charge
A% to A - 0.5%	2%
<A% - 0.5% and > or = A - 1.5%	5%
<A% - 1.5% and > or = A - 3.5%	10%
< A - 3.5%	20%

4.3. Time to Repair Target

- a. In the event that a Circuit is unavailable, Interoute will use all reasonable endeavours to restore service within the Time to Repair target of four (4) hours on Protected Circuits and eight (8) hours on Unprotected Circuits, provided access to the affected Premise is available.

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- b. Faults are considered to be repaired in the event of either a full or temporary repair being implemented, thus allowing continuity of Service.
- c. Where Interoute fails to meet the Time to Repair target, the Customer will be entitled to service credits on the applicable Circuit's Monthly Charge as follows:

Full Working Hours past Time to Repair Target	Service Credits as % of applicable Monthly Charge
1	2%
2	5%
3	10%
4 +	15%

- d. Where the fault arises from any Third Party Access, Interoute shall use all reasonable endeavours to manage the resolution of the fault within the Time to Repair target.

4.4. Packet Delivery

- a. For Customers purchasing an unmanaged Ethernet service, target Packet Delivery is >99.9% as calculated and averaged over all routes between Interoute Core IP Nodes during a Monthly Review Period.
- b. For Customers purchasing a Managed Ethernet service, target Packet Delivery is measured on an end-to-end basis over the customer's Ethernet Circuit and calculated during the Monthly Review Period for all traffic within contract.

Packet Delivery is not applicable to Planned Outage events on the Interoute IP Network and /or the Customer Port.

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- c. Average Percentage Packet Delivery is calculated monthly using the following formula:

T _{av} =	$\sum R_i$	X100
	$\sum S_i$	

Where:

- T_{av} the average Percentage Packet Delivery.
 R_i the total number of test packets received by each Core Ethernet Node from an originating Core Ethernet Node; and
 S_i the total number of test packets sent from the originating Core IP Node to each Core IP Node

- d. Packet Delivery will be measured on a per Interoute Core IP Node basis with the results reported for every fifteen (15) minute period on the Interoute hub.
- e. Where average Packet Delivery falls below the applicable target Packet Delivery percentage stated during any Monthly Review Period, the Customer will be entitled to Service credits as follows:

Packet Delivery during Monthly Review Period falling below 99.9% by:	Service Credits as % of Total Monthly Charges in the applicable Monthly Review Period:
Up to 1%	1%
Up to 2%	2%
Up to 3%	3%
More than 3%	4%

4.5. Round Trip Packet Delay

4.5.1. Measurements

- a. For Customers purchasing a **Managed Ethernet Flex Service**, target average Round Trip Packet Delay is measured on an end-to-end basis and the results are presented on the Interoute Hub every fifteen (15) minutes.
- b. For Customers purchasing other **Ethernet Flex Services**, target average Round Trip Packet Delay is measured across the core Ethernet nodes and the results presented on the Interoute Hub every fifteen (15) minutes.
- c. For Customers purchasing an **Ethernet Clear Service**, target average Round Trip Packet Delay has been measured across the core Ethernet nodes however it is not possible for Interoute to measure RTD without taking the Circuit out of service as part of a planned outage.

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4.5.2. Targets

- a. The target average Round Trip Packet Delay across the Third Party Access Circuit is dependant upon both the distance and whether a Managed service has been ordered. Based upon these two factors the target average Round Trip Delay is defined in the table below:

Access Technology:	Target Average Round Trip Delay (per 100km):
Private Circuits (Leased Lines or Ethernet) for Managed Ethernet customers	3ms
Private Circuits (Leased Lines or Ethernet) for other customers	no Service Level

The figures quoted for Third Party Access Circuits in the table above shall apply only to Circuits that terminate on an Interoute POP in the same country as the Customer Premise and shall not apply to International Private Leased Circuit (IPLC) access types. Round Trip Delay for IPLCs are available upon request.

Across the **Interoute Core Ethernet Network**, the following average target Round Trip Delays shall apply. These target Round Trip Delays are calculated by averaging the measurements taken from each Interoute Core Ethernet Node for all routes between each pair of regions in the table below.

Targets in milliseconds	Eastern Europe	Middle East	Nordics	Southern Europe	USA	Western Europe
Eastern Europe	30	175	50	40	125	35
Middle East			180	175	215	175
Nordics			20	55	125	35
Southern Europe				25	115	35
USA					10	100
Western Europe						25

- b. The Round Trip Delay for an individual pair of Interoute Core Ethernet Nodes that will be used for a specific service can be provided upon request at time of order.
- c. For 2Mbps to 16Mbps Ethernet Clear where Ethernet to SDH conversion is used the Round Trip Packet Delay times are affected by packet sizes and so it is necessary to add the following additional times to those above:
- 0ms for <256 bytes
 - 7ms for 256-512 bytes
 - 9ms for 513-1024 bytes and
 - 16ms for >1024 bytes.
- d. Where Round Trip Packet Delay is exceeded during any Monthly Review Period, the Customer will be entitled to a service credit equivalent to 5% of the affected relevant Circuits Monthly Charge for the relevant Monthly Review Period under consideration.
- e. The Averaging Period for RTD for Ethernet Clear is one second and for Ethernet Flex it is one calendar month.

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- f. For protected Ethernet Clear services, Round Trip Packet Delay is not applicable when traffic has switched to the protected path.

4.6. **Burst Traffic**

Interoute does not guarantee that the Customer will be able to Burst at any given time nor guarantee the RTD or packet delivery when burst is used. Burst capacity can not exceed the physical port size set out in the Purchase Order. Charges for Burst traffic are not included in the recurring fixed Annual or Monthly Charges.

4.7. **Limitations to payment of Service Credits**

- a. Exclusions of Service Credits are set out in clause 9.6 of Schedule 1.
- b. In respect of any Monthly Review Period the total amount of any service credit payable in relation to a breach of the Service Levels shall not exceed 50% of the Monthly Charge for the affected Circuit.
- c. Service credits do not apply to any Burst traffic above the Customers CBR or, in relation to Round Trip Packet Delay or Packet Delivery for Managed Ethernet CPE Option in the event that the Customer's use of any EVC exceeds 95 % of the CBR (based on a 15 minute average).
- d. Service Credits are not applicable for more than one breach of any Service Level outlined in this Schedule 2 arising from the same occurrence.

5. **FAULT REPORTING AND MANAGEMENT**

5.1. **Fault Handling**

Any suspected faults should be reported to the Interoute Customer Service Centre using the procedures detailed in the Service Handover Document to be provided to the Customer at the commencement of service. When reporting a fault, the Customer should identify the affected Circuit and provide details of the fault.

5.2. **Reporting on Repairs**

Interoute will provide the Customer with progress updates every two (2) hours, unless otherwise agreed.

5.3. **Fault Duration**

All faults recorded by the Network Management System will be reconciled against the corresponding fault ticket raised by the Customer Service Centre. The exact fault duration will be calculated as the elapsed time between the fault being reported to the Customer Service Centre and the time when service is restored.

6. **SERVICE LIMITS**

The below table describes the maximum capabilities of the Service:

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	Ethernet Flex	Ethernet Clear
MAC Addresses	Unmanaged: max 32 per site. Internet exchange limit available upon request Managed: No limitation	8000 for Ethernet over SDH Unlimited for Ethernet over wavelength
Customer Ethernet topology supported	Unmanaged: Static Managed: No limitation	Dynamic or static
VLAN transparency	Yes	Yes
Layer 2 Protocol Transparency for IEEE 802.1D Spanning Tree Protocol, Cisco VTP and CDP.	Unmanaged: Point-to-point services only without Managed Ethernet or direct connection to core routers Managed: No limitation	Yes
Maximum Ethernet frame size	1568 for Ethernet Flex via metro. 2014 for Ethernet Flex without metro.	1574 for Ethernet Clear using SDH and copper interface 2016 for Ethernet Clear using SDH and optical interface Unlimited for 1Gbps Ethernet Clear over wavelength
Connector/Presentation (MDI)	RJ45, SC/PC (Optical 1Gbps)	RJ45 for 100Mbps or below, SC/PC (Optical) for >100Mbps
Physical Interface Specification	10BaseT, 100BaseTX, 1000base LX/LH/SX/ZX/T	10BaseT, 100BaseTX, 1000base LX/LH/SX/ZX/T, 10Gb Base LR
10Gbps Physical Layer	Not applicable	LAN PHY or WAN PHY
Restoration	Typically 0.5s	< 50ms on protected services
Degradation Protection and auto reversion to primary/shortest path	Based on routing parameters	SNCP/N and SNCP/I are used on protected Circuits. Opt out if requested
Framing Format	IEEE 802.3	IEEE 802.3

Third Party Access Circuits used by Interoute to reach the Customer Premises might impose additional limitations which will be discussed prior to order signature and listed in the Purchase Order.

7. OPTIONAL SERVICES

Managed Ethernet

Managed Ethernet provides performance figures via the Interoute Hub web portal and is implemented using customer premises equipment managed by Interoute;

Protection

Protection is an optional feature configured on ports and across network paths that have sufficient means of switching to an alternate path in order to maintain or restore the service in the event of a service interruption for the Service to be considered by Interoute to be protected.