

# GTS Hungary Interface Specifications with Sprint Intl Czech Rep s.r.o.

## 1. GTS SERVICE OFFERING

This service offering shall be reviewed as part of the review meetings

### 1.1 END CONNECTIONS

1.1 'A' end Connection	LAP
<ul style="list-style-type: none"> <li>• Connect at SDH / STM-4 electrical or optical level</li> <li>• Connect at SDH / STM-1 electrical or optical level</li> <li>• Connect at PDH / E1, E3, T3, E4 level</li> </ul>	<p>Case-by-case</p> <p>Yes</p> <p>Yes</p>
1.2 'B' end Connection	
<ul style="list-style-type: none"> <li>• Connection at SDH / STM-1 electrical or optical level</li> <li>• Connect at PDH / E1, E3, T3 level</li> </ul>	<p>Yes</p> <p>Yes</p>

### 1.2 LOCAL ACCESS SERVICES

#### 1.2.1 Single-link

N	Case	SDH
a	Point-to-point 1+1 protected	Yes
b	Point-to-point unprotected	Yes

#### 1.2.2 Dual-link

N	Case	SDH
a	2 diverse and unprotected point-to-point at the same time: <b>one</b> Customer PoP and <b>one</b> SPRINT PoP	Yes
b	2 diverse and unprotected point-to-point at the same time: <b>one</b> Customer PoP and <b>two</b> SPRINT PoPs	No
c	2 diverse and unprotected point-to-point at the same time: <b>two</b> Customer PoPs and <b>one</b> SPRINT PoP	Yes
d	2 diverse and unprotected point-to-point at the same time: <b>two</b> Customer PoPs and <b>two</b> SPRINT PoPs	No

### 1.3 Bandwidth and interfaces

With regards to the Services defined before, GTS can provide the availability of the following set of interfaces at the different bandwidths both at the SPRINT PoP and the Customer PoP termination ends of the Service:

<b>Bandwidth</b>	<b>Presentation at GTS PoP</b>	<b>Presentation at Customer PoP</b>	<b>LAP</b>
<b>2 Mb/s</b>	STM-1/VC1 electrical (G.703 / 2 1 ) optical	G.703 at 2 Mb/s (El)	Yes
	STM-1 electrical(G.703 / /VC12 l) optical	STM-1/VC 12 electrical (G.703)/optical G.957)	Yes
<b>34 Mb/s</b>	STM-1 / 16*VC12 electrical (G.703) /	16*G.703 at 2 Mb/s	Yes
	STM-1 / 16*VC12 electrical (G.703) /	STM-1 / 16*VC12 electrical (G.703)	Yes
	STM-1 / VC3 electrical optical (G.957)	G.703 at 34 Mb/s	Yes
	STM-1 / VC3 electrical (G.703) / optical (G.957)	STM-1 / VC3 electrical (G.703) / optical (G.957)	Yes
<b>45 Mb/s</b>	STM-1 / 21 *VC12 electrical (G.703) / optical (G.957)	21 *G.703 at 2 Mb/s	Yes
	STM-1 / 21 *VC12 electrical (G.703) / optical (G.957)	STM-1 / 21 *VC12 electrical (G.703) / optical (G.957)	Yes
	STM-1 / VC3 electrical (G.703) / optical (G.957)	G.703 at 45 Mb/s	Yes
	STM-1 / VC3 electrical (G.703) / optical (G.957)	STM-1 / VC3 electrical (G.703) / optical (G.957)	Yes
<b>140 Mb/s</b>	STM-1 / VC4 electrical (G.703) /	G.703 at 140 Mb/s	Yes
	STM-1 / VC4 electrical (G.703) /	STM-1 / VC4 electrical (G.703) /	Yes
	STM-1/ mix VC12/VC3 electrical (G.703) / optical	Mix of 2/34/45 Mb/s (G.703)	Yes
	STM-1/ mix VC12/VC3 electrical (G.703) / optical (G.957)	STM-1/ mix VC12/VC3 electrical (G.703) /optical (G.957)	Yes
	STM-4 VC 4 -4C optical (G.957)	STM-4 VC 4 -4C optical (G.957)	Case- by- case
<b>622Mb/s</b>	4*STM-1 / 4*VC4 electrical (G.703) / optical (G.957)	4*STM-1 / 4*VC4 electrical (G.703) / optical (G.957)	Case-by- case
	4*STM-1 / mix VC12,VC13,VC4 (G.703) / optical (G.957)	Mix of 2/34/45/140 Mb/s (G.703)	Case-by- case
	4*STM-1 / mix VC12,VC13,VC4 (G.703) / optical (G.957)	4*STM-1 / mix VC12,VC13,VC4 (G.703) / optical (G.957)	Case-by- case
<b>2.5Gb/s</b>	16*STM-1 / 16*VC4 electrical (G.703) /optical (G.957)	16*STM-1 / 16*VC4 electrical (G.703) / optical (G.957)	Case-by- case

	16*STM-1 / mix VC12,VC13,VC4 (G.703) / optical (G.957)	16*STM-1 / mix VC12,VC13,VC4 (G.703) / optical (G.957)	Case-by- case
	16*STM-1 / mix VC12,VC13,VC4 (G.703) / optical (G.957)	Mix of 2/34/45/140 Mb/s (G.703)	Case-by- case

GTS provides point-to-point Transmission Capacity by various bandwidth, on circuits with their speed ranging from 2Mbps to the plural of 155 Mbps, accompanied by providing local access („integrated offer") or without it („backbone offer"). GTS offers point-to-point transmission capacity in addition to local access on one end point of the circuit, depending on the specific order.

According to the table, the bandwidth can be provided between the two end-points of a given circuit within one circuit (*unstructured* offer) or in the bundle of sub-bit rate circuits (*structured* offer). In the structured offer all sub-bit-rates are implemented between the same end-points. For example, on a structured 34 Mbps circuit all 16 E1 sub-bit rate will be presented at the same terminal point.

Interfaces can be electrical (ITU-T Rec. G. 703) or optical (ITU Rec.: G. 957). The SDH standard interfaces are of 155 Mbps. The higher bit-rate SDH interfaces (STM-4) considered on a project-to-project basis.

The structured services operate between identical end-points, and are displayed to the customer through multiple interfaces.

#### 1.4 Interfaces on the Customer's premise

In case of backbone service between the two end points of the circuit, transmission is performed through an SDH infrastructure. The local access sections can occasionally be established with PDH systems. Depending on the request of the Customer, circuits get to the customers through PDH interfaces (E1, E3, T3, E4) or through SDH interfaces (STM-1 /VC-xx). In the case of E1, E3/T3/E4 interfaces, the customer receives only 2/34/45/140 Mbps payload capacity only. In the case of VC-12/VC-3/VC-4 interfaces, the customer receives the corresponding payload capacity and also the SDH Path Overhead (POH)<sup>1</sup>, too.

Table 1a and 1b show the various bandwidth-configurations available to the customers in case of backbone service, or depending on the feasibility of the local access point, in the case of integrated service. In accordance with the individual orders, at the end-points there can be different interfaces, and on request, other interface solutions are also available.

According to the table, the bandwidth can be provided between the two end-points of a given circuit within one circuit (*unstructured* offer) or in the bundle of sub-bit rate circuits (*structured* offer). In the structured offer all sub-bit-rates are implemented between the same end-points. For example, on a structured 34 Mbps circuit all 16 E1 sub-bit rate will be presented at the same terminal point.

Bandwidth	presentation	customer interfacing (" <i>backbone</i> " offer)
<b>2.048 kbps</b>		
PDH, unstructured	E1	1 x G.703 @ 2.048 kbps (electrical)

SDH, unstructured	VC-12	1 x G.703 @ 155 Mbps (electrical STM-1/VC-12)
<b>34 Mbps</b>		
PDH, unstructured	E3	1 x G.703 @ 34 Mbps (electrical)
PDH, structured	16 x E1 (*)	16 x G.703 @ 2.048 kbps (electrical)
SDH, structured	16 x VC-12 (*)	1 x G.703 @ 155 Mbps (electrical STM-1/16 x VC-12)
<b>45 Mbps</b>		
PDH, unstructured	T3	1 x G.703 @ 45 Mbps (electrical)
PDH, structured	21 x E1 (*)	21 x G.703 @ 2,048 kbps (electrical)
SDH, unstructured	VC-3	1 x G.703 @ 155 Mbps (electrical STM-1/VC-3)
SDH, structured	21 x VC-12 (*)	1 x G.703 @ 155 Mbps (electrical STM-1/21 x VC-12)
SDH, structured	21 x VC-12 (*)	1 x G.703 @ 155 Mbps (electrical STM-1/21 x VC-12)
<b>155Mbps</b>		
PDH, unstructured	E4	1 x G.703 @ 140 Mbps (electrical)
PDH, structured	3 x E3(*)	3 x G.703 @ 34 Mbps (electrical)
PDH, structured	3 x T3(*)	3 x G.703 @ 45 Mbps (electrical)
PDH, structured	63 x E1 (*)	63 x G.703 @ 2 Mbps (electrical)
SDH, unstructured	VC-4	1 x G.703 @ 155 Mbps (electrical STM-1/VC-4) <del>1 x G.957 @ 155 Mbps (optical STM-1/VC-4)</del>
SDH, structured	VC-12 / VC-3(*) mixed	1 x G.703 @ 155 Mbps (electrical STM-1/VC-12/VC-3 mixed) 1 x G.957 @ 155 Mbps (optical STM-1/VC-12 / VC-3 mixed)
PDH, structured	63 x E1 (*)	63 x G.703 @ 2 Mbps (electrical)
SDH, unstructured	VC-4	1 x G.703 @ 155 Mbps (electrical STM-1/VC-4)
SDH, structured	VC-12 / VC-3(*) mixed	1 x G.703 @ 155 Mbps (electrical STM-1/VC-12/VC-3 mixed) 1 x G.957 @ 155 Mbps (optical STM-1/VC-12 / VC-3 mixed)

Table 1a. Various bandwidth configurations available to the customers in case of backbone service.

<b>Bandwidth</b>	Presentation	<b>customer interfacing (SDH Local Access)</b>	<b>customer interfacing (PDH Local Access)</b>
<b>2.048 kbps</b>			
PDH, unstructured	E1	1 x G.703 @ 2.048 kbps (electrical)	1 x G.703 @ 2.048 kbps (electrical)
SDH, unstructured	VC-12	1 x G.703 @ 155 Mbps (electrical STM-1/VC-12)	N/A
<b>34 Mbps</b>			
PDH, unstructured	E3	1 x G.703 @ 34 Mbps (electrical)	1 x G.703 @ 34 Mbps (electrical)
PDH, structured	16 x E1(*)	16 x G.703 @ 2.048 kbps (electrical)	16 x G.703 @ 2.048 kbps (electrical)
SDH, structured	16 x VC-12 (*)	1 x G.703 @ 155 Mbps (electrical STM-1/16 x VC-12)	N/A
<b>45 Mbps</b>			
PDH, unstructured	T3	1 x G.703 @ 45 Mbps (electrical)	N/A
PDH, structured	21 x E1(*)	21 x G.703 @ 2.048 kbps (electrical)	N/A
SDH, unstructured	VC-3	1 x G.703 @ 155 Mbps (electrical STM-1/VC-3)	N/A
SDH, structured	21 x VC-12 (*)	1 x G.703 @ 155 Mbps (electrical STM-1/21 x VC-12)	N/A
<b>155 Mbps</b>			
PDH, unstructured	E4	1 x G.703 @ 140 Mbps (electrical)	N/A
PDH, structured	3 x E3(*)	3 x G.703 @ 34 Mbps (electrical)	N/A
PDH, structured	3 x T3(*)	3 x G.703 @ 45 Mbps (electrical)	N/A
PDH, structured	63 x E1(*)	63 x G.703 @ 2 Mbps (electrical)	N/A
SDH, unstructured	VC-4	1 x G.703 @ 155 Mbps (electrical STM-1/VC-4) 1 x G.957 @ 155 Mbps (electrical STM-1/VC-4)	N/A
SDH, structured	VC-12/ VC-3(*) mixed	1 x G.703 @ 155 Mbps (electrical STM-1/VC-12/VC-3 mixed) 1 x G.957 @ 155 Mbps (optical STM-1/VC-12/VC-3 mixed)	N/A

Table 1b.: Various bandwidth configuration available to the customers in case of integrated services

- "*n x G.703 @ 2.048 kbps (electrical)*" means that 'n' of circuits are provided through 'n' number of G.703 electrical interfaces at the speed of 2.048 kbps.
- "*1 x G.703 @ 155 Mbps (electrical STM-1/N x VC-12)*" means that N x VC-12 circuits are provided through a single G.703 electrical interface at 155 Mbps.
- "*1 x G.703 @ 155 Mbps (electrical STM-1/mix VC-12/VC-3)*" means that mix of VC-12 and VC-3 circuits are provided through a single G.703 electrical interface at 155 Mbps.

A GTS supports a variety of connectors in order to forward its services to the customers' premises. Depending on the individual standard of the local service provider, this connector can be electrical BNC 75Ω, Krone 120Ω, Pouyet 120Ω, 1.6/5.6 75Ω, 1.0/2.3 75Ω, RJ45 120Ω, BT43 75Ω; optical E-2000/APC SC/PC, SC/APC/FC/PC, FC/APC. In case of service restricted to the GTS backbone network (without local access) connection takes place with the help of electrical 1.6/5.6 75Ω or optical E2000/APC, or occasionally SC/PC standard connectors

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