DR/CO	APVD	DESCRIPTION	DATE	REV
		First draft. GP-032354. Agendum 7.2.5.3.1	17 Nov 03	0

Juicy Bits

For simplicity, this figure assumes the internet protocol (IP) will be the only packet data protocol (PDP) handled by the GGSN.

Each mobile station can create up to 11 PDP contexts, limited by the number of NSAPIs available at the top of SNDCP in the SGSN. In this figure, Mobile Station 1 has created 4 PDP contexts: 1 primary PDP context and another primary PDP context with its 2 associated secondary PDP contexts. A primary context and its associated secondary contexts share an IP address.

For a group of PDP contexts that share an IP address, all contexts except one require a TFT. A TFT basically comprises a group of packet filters that route incoming IP packets to the proper PDP context, and therefore, the appropriate tunnel and quality of service. The primary context has no TFT; its associated TFT handles packets that cannot be handled by any other PDP context in the group.

For some reason GTP-C, not session management, issues *PDP-context* commands and responses, *e.g., create PDP context request*. This figure assumes that a GTP manager executes these commands. As such, the GTP manager could be viewed as being a part of GTP-C.

2^{32} TEIDs are available. The SGSN chooses its TEID when it sends a *create PDP context request*. The GGSN chooses its TEID when it responds with a *create PDP context response*. Since SGSN and GGSN choose their own TEIDs, the TEIDs on each tunnel may be different. Alternatively, both SGSN and GGSN choose TEIDs for the control plane once; they choose TEIDs for the user plane each time they establish a PDP context.

TEID 0 is basically a default tunnel-endpoint identifier for the control plane. Once the GGSN has selected another TEID for the control plane, the SGSN normally uses this TEID. Unfortunately, there are many exceptions.

GTP-C PDUs are sent to UDP port 2123. They originate from a source-assigned port. GTP-U PDUs are sent to UDP port 2152. They originate from a source-assigned port.

Well-known ports are 0 through 1023; registered ports are 1024 through 49151; dynamic ports are 49152 through 65535.

The SGSN may obtain the GGSN's IP address by executing a DNS query of the GGSN's logical name. The SGSN stores this address for the duration of the PDP context. The GGSN may signal an IP address to use for the uplink control plane and an IP address to use for the uplink user plane, e.g., in the *create PDP context response*.

The SGSN signals an IP address to use for the downlink control plane and an IP address to use for the downlink user plane, e.g., in the *create PDP context request*.

11 NSAPIs are available: 5 through 15.

Based on QoS, the SNDCP Manager selects which SAPI will serve a given NSAPI.

Due to poor layering and poor PDU structure, NM and other signalling entities need to look for their PDUs on all BVCs instead of just the signalling BVC (BVC 0). BSSGP allows to send PDUs on BVCs other than the signalling BVC.

Although 48.018 specifies that PFM has its own SAP (§9 5.1 and 8a), it also contradicts itself by specifying that PFM operates via the NM SAP (§ 10.4).

SAPI is 4-bits, which allows 16 different identities. 4 SAPIs identify the links available to SNDCP: 3, 5, 9, and 11. SAPI 1 identifies the link for GMM.

PFI, which identifies a PFC, is 7 bits. This allows 128 identities. 4 default PFCs exist for each mobile station: best-effort (0), signalling (1), SMS (2), and LCS (3). *Best effort* and SMS can be assigned to any PDP context.

Since one PFI corresponds to one SAPI, why are there more PFIs than SAPIs?

Each BSSGP data PDU contains one LLC PDU.

The Packet Flow Manager performs the following:
- Download PFC.
- Create PFC.
- Modify PFC.
- Delete PFC.

The GMM Server performs the following:
- Paging.
- RAC update.
- Radio status.
- Suspend.
- Resume.

The Network Manager performs the following:
- Flow control.
- Flush.
- Discard.
- Suspend.
- BVC block.
- BVC reset.
- Trace.

Network Service Control shares BVC traffic among the NS-VCs. 48.016 calls this *load sharing*. Once an NS-VC carries traffic for a specific mobile station (*i.e.*, a specific TLLI), it exclusively continues to carry traffic for that mobile station until the mobile station can no longer be served by the NS-VC, *e.g.*, the mobile station relocates or the NS-VC is blocked. 48.016 requires *in-sequence* network-service delivery. Since the TLLI isn't visible to the network-service layer, BSSGP provides the LSP as a surrogate.

BVC 0 carries signalling. BVC 1 carries PTM traffic. Other BVCs carry PTP traffic.

Based on information provided by its peer, the load-sharing function initially selects the NS-VC to be used by SDUs for a given LSP. Subsequently, the resource-distribution function may change the NS-VC.

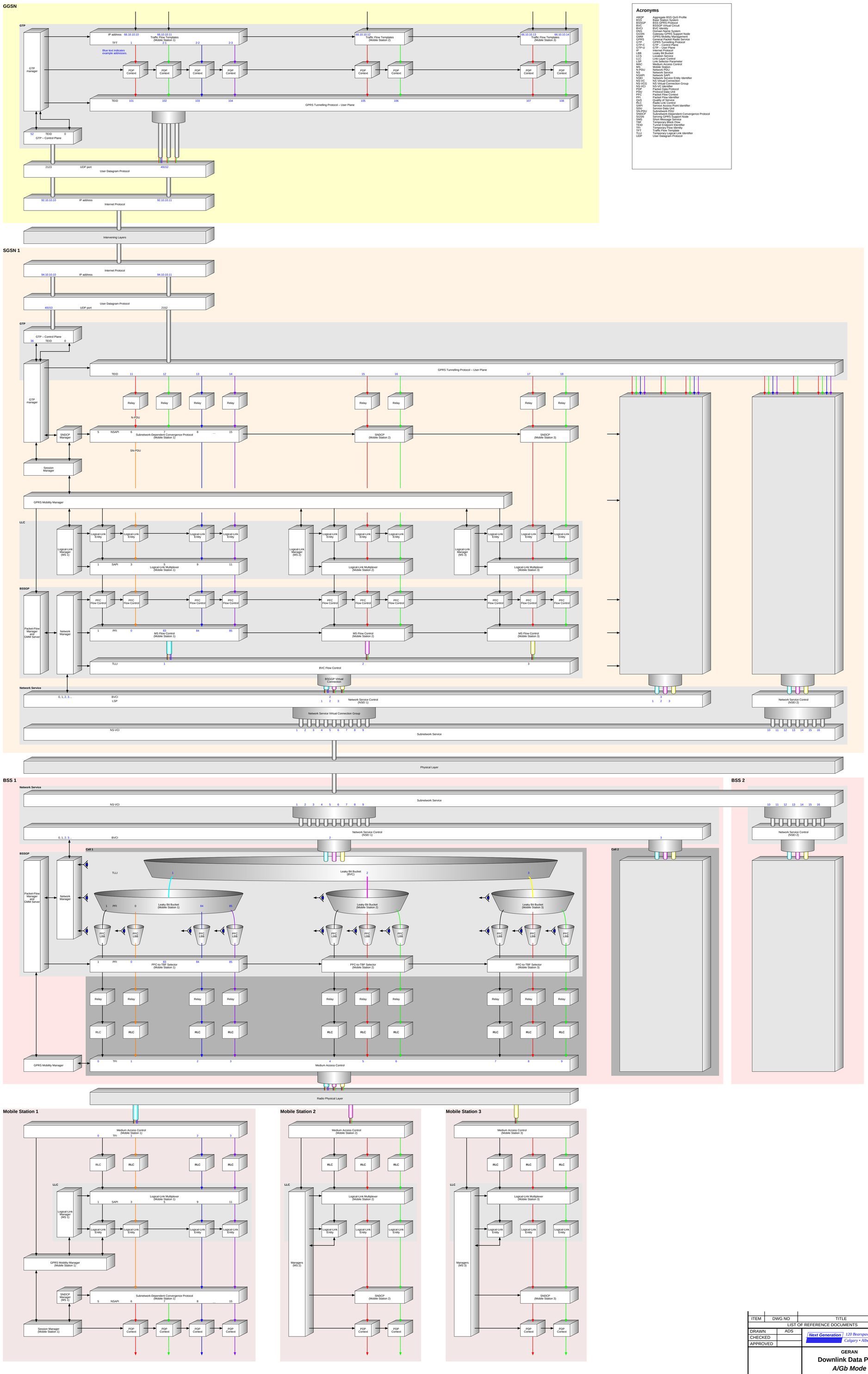
An NS-VCI identifies an NS-VC. For an IP network, an IP address and UDP port number at each end of the virtual connection also identify an NS-VC.

This figure assumes the Packet Flow Manager controls which PFC is carried by a TBF. 48.018 does not specify this function. MAC reconfigures the TBF if required.

In the BSS, PFI acts as a surrogate for SAPI. Since SAPI identifies a service access point at the top of the link layer, this access point is only visible in the SGSN and mobile station, not the BSS.

Although 23.060 clearly shows that the BSS does not contain GMM, 48.018 clearly shows that it does.

TFI is 5 bits, which allows 32 different TBFs per PDCH.



Acronyms

ABQP	Aggregate BSS QoS Profile
BSS	Base Station System
BSSGP	BSS GPRS Protocol
BVC	BSSGP Virtual Circuit
BVCI	BVC Identity
BSS	Base Station System
GGSN	Gateway GPRS Support Node
GMM	GPRS Mobility Management
GPRS	General Packet Radio Service
GTP	GPRS Tunnelling Protocol
GTP-C	GTP – Control Plane
GTP-U	GTP – User Plane
IP	Internet Protocol
LBB	Leaky Bit Bucket
LCS	Location Service
LLC	Link-Layer Control
LSP	Link Selector Parameter
MAC	Medium Access Control
MS	Mobile Station
N-PDU	Network PDU
NS	Network Service
NSAPI	Network SAPI
NSEI	Network Service Entity Identifier
NS-VC	NS Virtual Connection
NS-VCG	NS Virtual Connection Group
NS-VCI	NS-VC Identifier
PFM	Packet Flow Protocol
PDU	Protocol Data Unit
PFC	Packet Flow Context
PFI	Packet Flow Identifier
QoS	Quality of Service
RLC	Radio Link Control
SAP	Service Access Point Identifier
SAPI	Service SAP Identifier
SN-PDU	Subnetwork PDU
SNDCP	Subnetwork-Dependent Convergence Protocol
SGSN	Serving GPRS Support Node
SMS	Short Message Service
TBF	Temporary Block Flow
TEID	Tunnel Endpoint Identifier
TFI	Traffic Flow Identity
TFT	Traffic Flow Template
TLLI	Temporary Logical Link Identifier
UDP	User Datagram Protocol

ITEM	DWG NO	TITLE	REV
LIST OF REFERENCE DOCUMENTS			

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GERAN
Downlink Data Pipes
A/Gb Mode

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SCALE | SHEET 1 CONTINUED ON –