

PDP

The data connection is divided into two steps GPRS Attach and Packet Data Protocol (PDP) Context Activation.

GPRS Attach

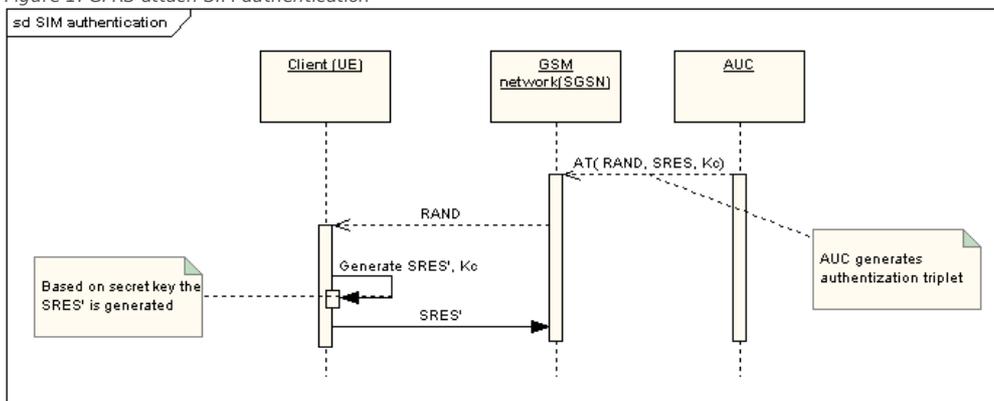
The GPRS Attach is a process during which the mobile device informs the network about its presence in the network. The device usually initiates the GPRS attach after power on. The message sent to the new Serving GPRS Support Node (SGSN) contains the last assigned Temporary Mobile Subscriber Id (TMSI), location area information, etc. The new SGSN queries the old SGSN (used last time) for the identity of this mobile device. Then the new SGSN requests more information from the mobile device to authenticate itself against the new SGSN. Authentication is based on the secret information saved on SIM card and in the AUC.

The AUC generate authentication triplet AT(RAND, SRES, Kc), where

- RAND is random value
- SRES (Signed RESult) is result of A3 operation $SRES = A3(RAND, Ki)$, where Ki is secret key shared by SIM and AUC
- Kc (Cipher key) is result of A8 operation $Kc = A8(RAND, Ki)$

The RAND is resend to the mobile device, which perform exactly the same operation and generate SRES', which is send back to the SGSN. If SRES' = SRES, SIM is authenticated. Kc is used later for ciphering in GSM.

Figure 1. GPRS attach SIM authentication



After SIM card is authenticated SGSN updates location records in HLR database. Once registered, the network has knowledge of the location of the mobile device at a Routing Area level.

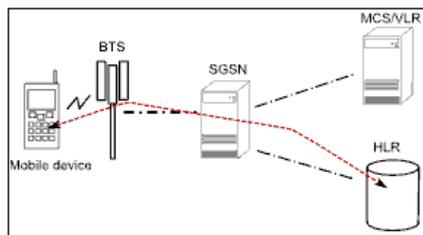


Figure 2. GPRS attach overview

After the SGSN accepts the attachment, it keeps track of the mobile device in the coverage area. SGSN needs to know where the mobile is for the case when data arrive and need to be routed to the device.

Packet Data Protocol (PDP) Context Activation

After the GPRS Attach procedure (i.e. terminal is attached to SGSN and it was authorized, which means that it can access GPRS services and the identity was checked - authentication) is over, the terminal is pre-prepared for the data communication. In the most common situation the terminal wants to communicate with the server in the Internet or in other external network (called PDN - Packet Data Networks) accessed through operator's backbone. Some data services (MMS) are also provided by operator itself. Mobile device must establish the data connection and the PDP address (currently IPv4 or IPv6) from the accessed network rank must be assigned to the terminal.

So when terminal wants to start the communication it initiates establishing of Packet Data Protocol Context (PDP context). Saying with other words: After GPRS attach, when is the terminal attached to an SGSN, it must activate a PDP address (in this case, an IP address) when it wishes to begin a packet data communication. This is usually done on application request, but in some situations user could decide to be 'on-line' for the whole time and then the data connection is established during the phone boot sequence (e.g., registration into IMS). Symbian devices (from OS 8.0a, i.e., S60 2nd Edition, FP2) can request to activate more than one PDP contexts (multihoming), where each context specifies one PDN it wants to access. It which means that a PDP context activation procedure is initiated for each data connection to different PDN.

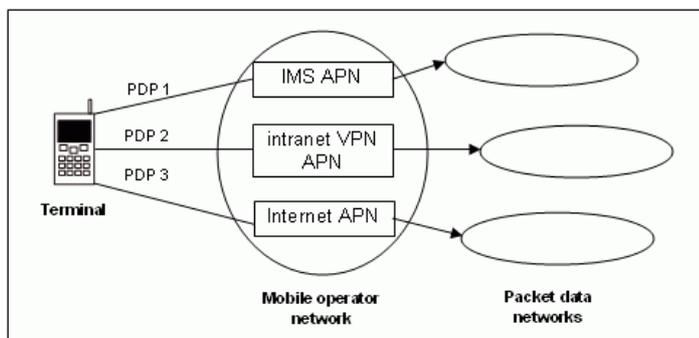


Figure 3. Multihoming

Terminal must specify the network service access point - the Access Point Name (APN) of the PDN it wants to connect to. This is usually provisioned by BIO message or entered manually by us

er. The SGSN identifies the corresponding GGSN for requested PDN and make it aware of the mobile device Then two way point-to-point tunnel is established between the SGSN and the GGSN. In other words activating a PDP address sets up an association between the terminal's current SGSN and the GGSN that anchors the PDP address. A record is kept regarding the associations made between the GGSN and SGSN. This record is known as a PDP context. PDP context is describing the characteristic of the connection: network and address type, APN, QoS, priorities, billing, etc.



Figure 4. Configuring APN on device

On the figure below is the packet flow taken on the Gn interface (SGSN-GGSN). There is PDP context request and response and then the SIP communication is started between terminal (which receives the IP (192.168.183.1) address from the IMS PDN address rank) and the P-CSCF. All SIP data packet traffic send between those endpoints go through SGSN and GGSN. GGSN hides the mobility of the terminal. As displayed on figure, all data send to between SGSN and GGSN are encapsulated in the GPRS tunneling protocol (GTP).

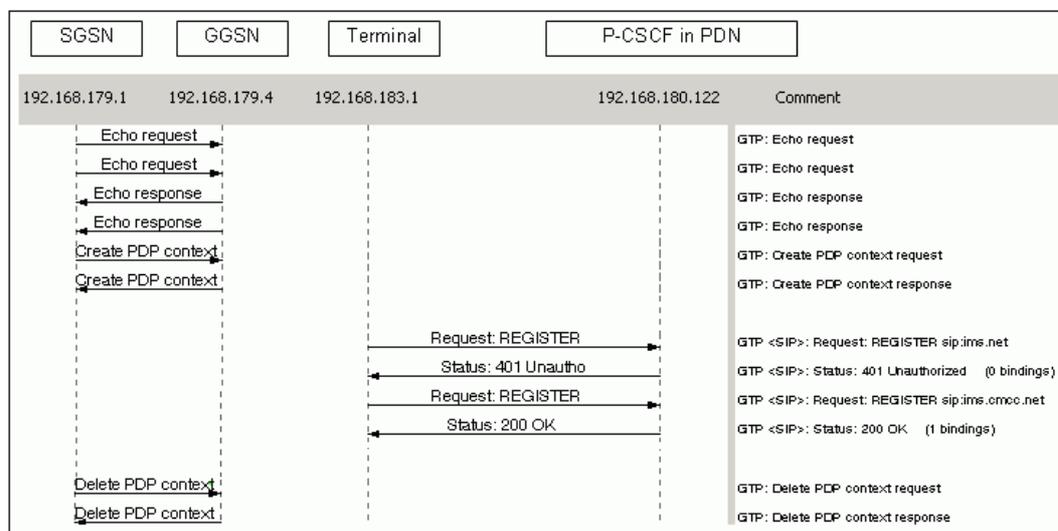


Figure 5. GTP on Gn interface

RConnection class

--stenlik 08:34, 21 April 2007 (UTC)

