Mobile Data offload

An AdvOSS Solution White Paper

Whitepaper URL
www.advoss.com/resources/whitepapers/mobile-data-offload.pdf

For more information, contact sales@AdvOSS.com

Mobile Data Offload

Mobile Data Offload allows a cellular mobile operator to offload some of its data and voice traffic off its Radio Access Network (RAN) onto complementary network technologies. Most popular such technologies are:

1. Wi-Fi
2. Wi-Max
3. Femto Cells

Dual mode and multi-mode handsets now allow easier offloading of data and voice to complementary network technologies. This white paper discusses the AdvOSS solution available to cellular network operators (GSM and CDMA) for mobile data offloading.

Complementary Network Technologies

Different technologies are used in different scenarios on physical layer to offload the traffic.

Wi-Fi

Typically backed by wireline backhaul provided by third parties, this technology offers the most potential because of its ubiquitous nature and availability in most residential and business units. The access network may also be provided by cellular network operator in some most congested indoor areas where otherwise signal strength is poor.
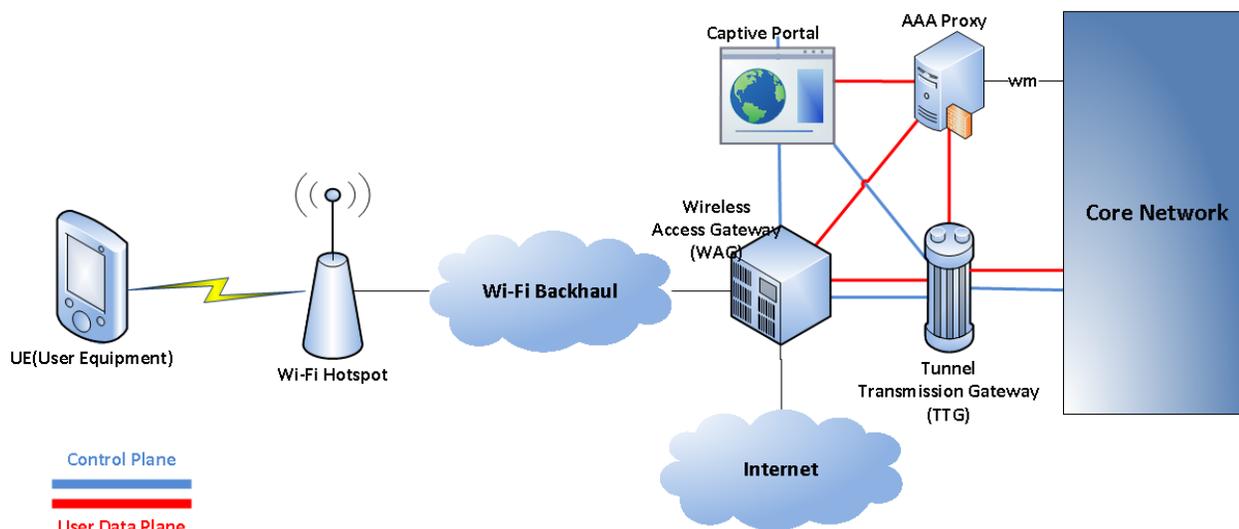
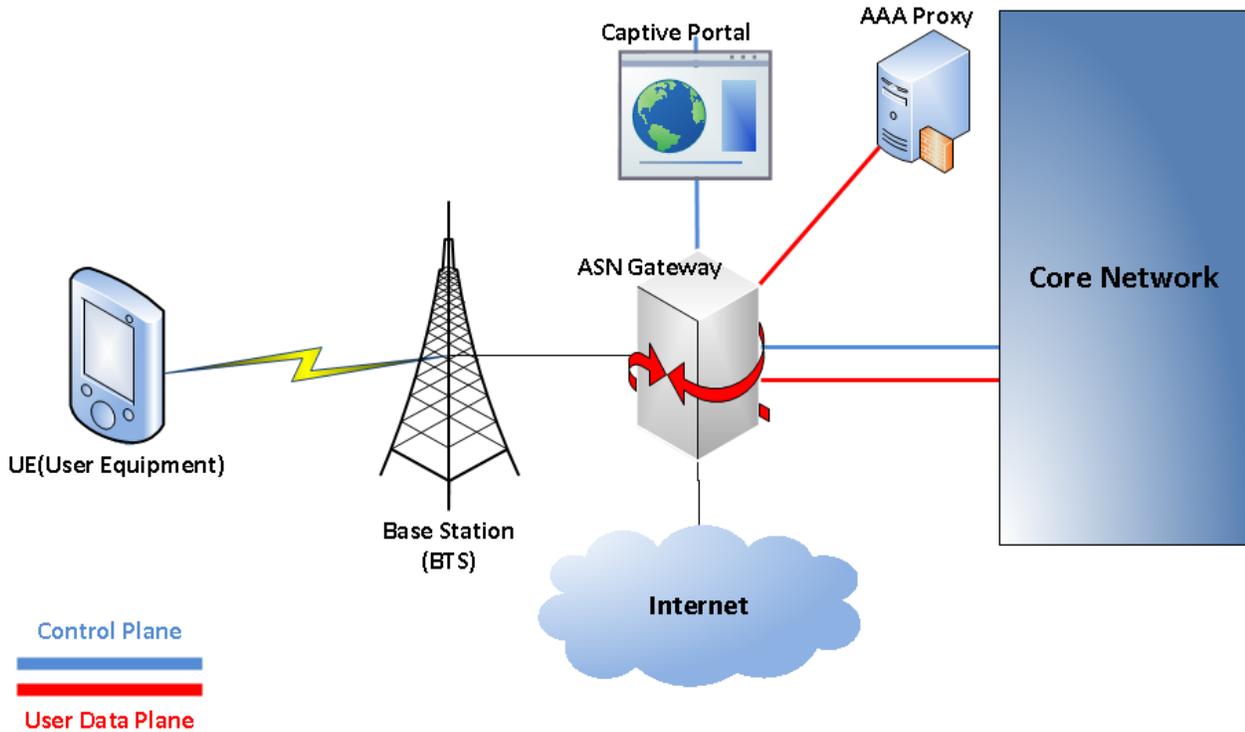There are two options for data traffic handling in this case.

1. Data is offloaded by routing it directly to the Internet at the Access Gateway via Wi interface.
2. Data is passed through to core network by terminating tunneled traffic coming from Wi-fi backhaul at the TTG, and then passing it to GGSN in the core network.

Option 1 is the recommended option since it could save considerable load on GGSN and the core network in general.

Wi-Max

Wi-Max offers an alternative technology to cellular operators to offload data and offers much better mobility than wi-fi or femto cells. It offers an option to existing cellular operators who might not have a 3G / 4G license to offer data services in conjunction with their 2G voice services either over an unlicensed spectrum or in conjunction with another operator who might have license for the Wi-Max spectrun. Dual Mode handsets GSM / Wi-Max or CDMA / Wi-Max

are available for this purpose.

In this case, we again have two options for data traffic handling in this case.

1. Data is offloaded by routing it directly to the Internet at the ASN Gateway.
2. Data is passed through by ASN-Gateway to GGSN in the core network.

Here again, Option 1 is the recommended option since it could save considerable load on GGSN and the core network in general.

Femto Cells

Femto Cells offer an alternate technology to cellular operators to provide smaller units in residential and business units that support 2 to 16 active mobile users. A typical simplified deployment scenario is shown below.
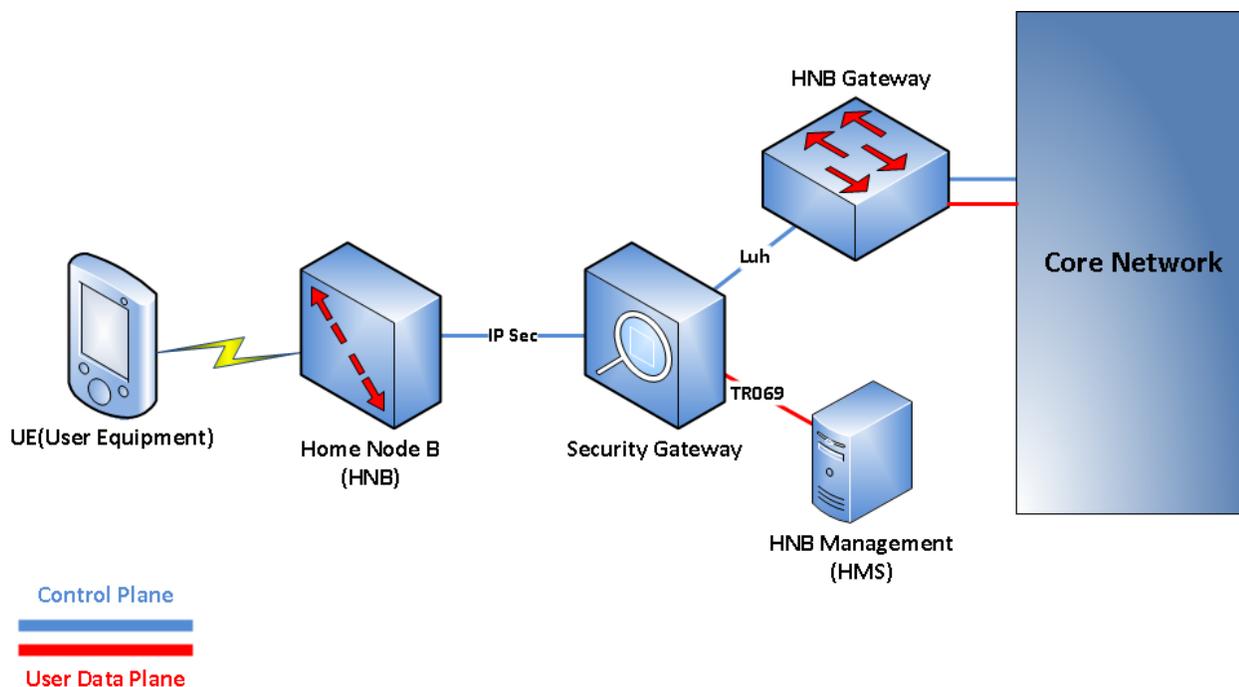
Interface with Existing Core Network

AdvOSS Offers different options to interface with existing core networks of cellular operators. In the following sections we discuss these options in detail.

Option 1: RADIUS client on Access Gateway, DIAMETER based 3GPP elements in Core network
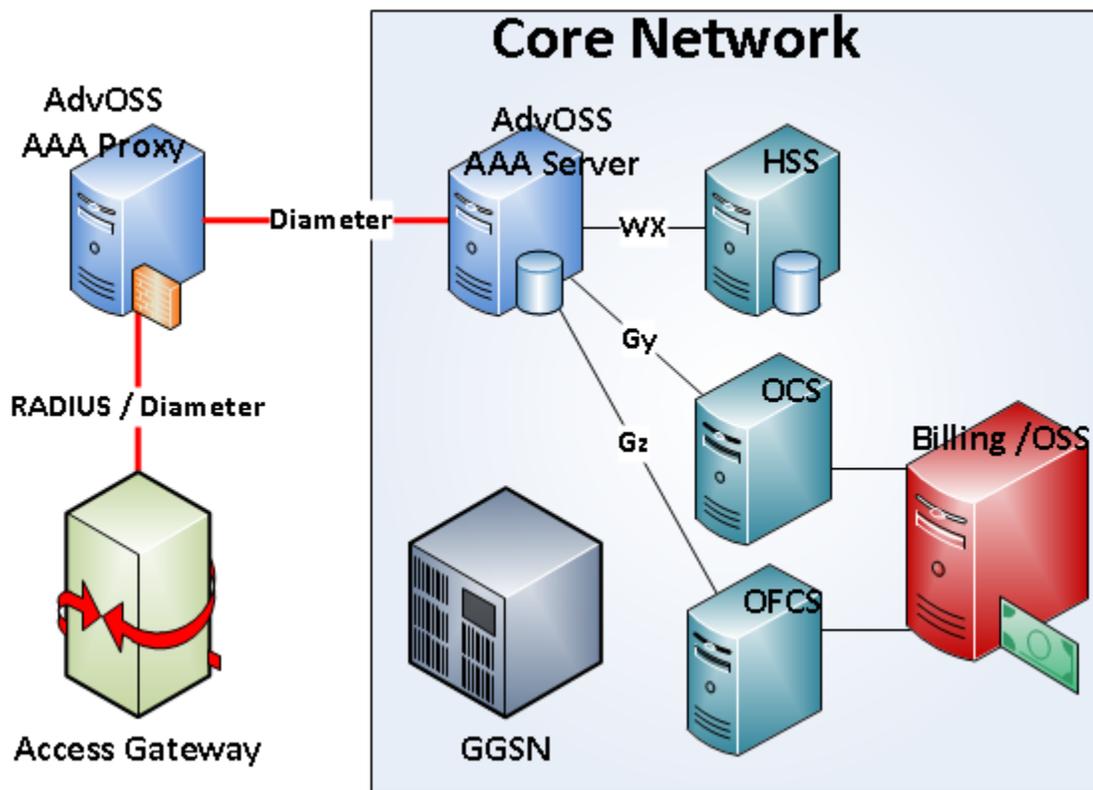
- In this case, the Access gateway has RADIUS client for AAA.
- The core is using 3GPP compliant DIAMETER based core network elements such as HSS, OCS and OFCS etc.
- The AAA proxy acts as a RADIUS server for the gateways and converts the requests to DIAMETER, and passes them to the DIAMETER server in core network.

- The back-end DIAMETER interface to the core network uses the following standardized interfaces:

  - Wx for Authentication from HSS
  - Gy for Prepaid from OCS
  - Gz for offline charging from OFCS

Option 2: Diameter client in Access Gateway, Diameter based 3GPP elements in Core network

- In this case, the Access gateway has DIAMETER client for AAA.
- The core is using 3GPP compliant DIAMETER based core network elements such as HSS, OCS and OFCS etc.
- A DIAMETER proxy is not strictly required in this case, however may be used for routing DIAMETER requests to home network while roaming, or for load balancing and AAA traffic distribution purposes. Access Gateways directly access the DIAMETER servers in core network.
- The DIAMETER interface to the core network uses the following standardized interfaces:

  - Wx for Authentication from HSS
  - Gy for Prepaid from OCS
 - Gz for offline charging from OFCS

Option 3: Radius client in Access Gateway, SS7 based interface to HLR in core network

- In this case, the Access gateway has RADIUS client for AAA.
- The core network has an HLR for storing user authentication credentials and other user specific data.

- AdvOSS AAA proxy routes RADIUS based AAA requests from Access Gateways to AAA server in the core network. The following options are typically used for AAA:

EAP-SIM based Authentication
  - For EAP-SIM we have two options:
  - Translate signaling between RADIUS and SS7 to access the user credentials in HLR during EAP-SIM Authentication via a SIGTRAN gateway function (provided by third parties).

---
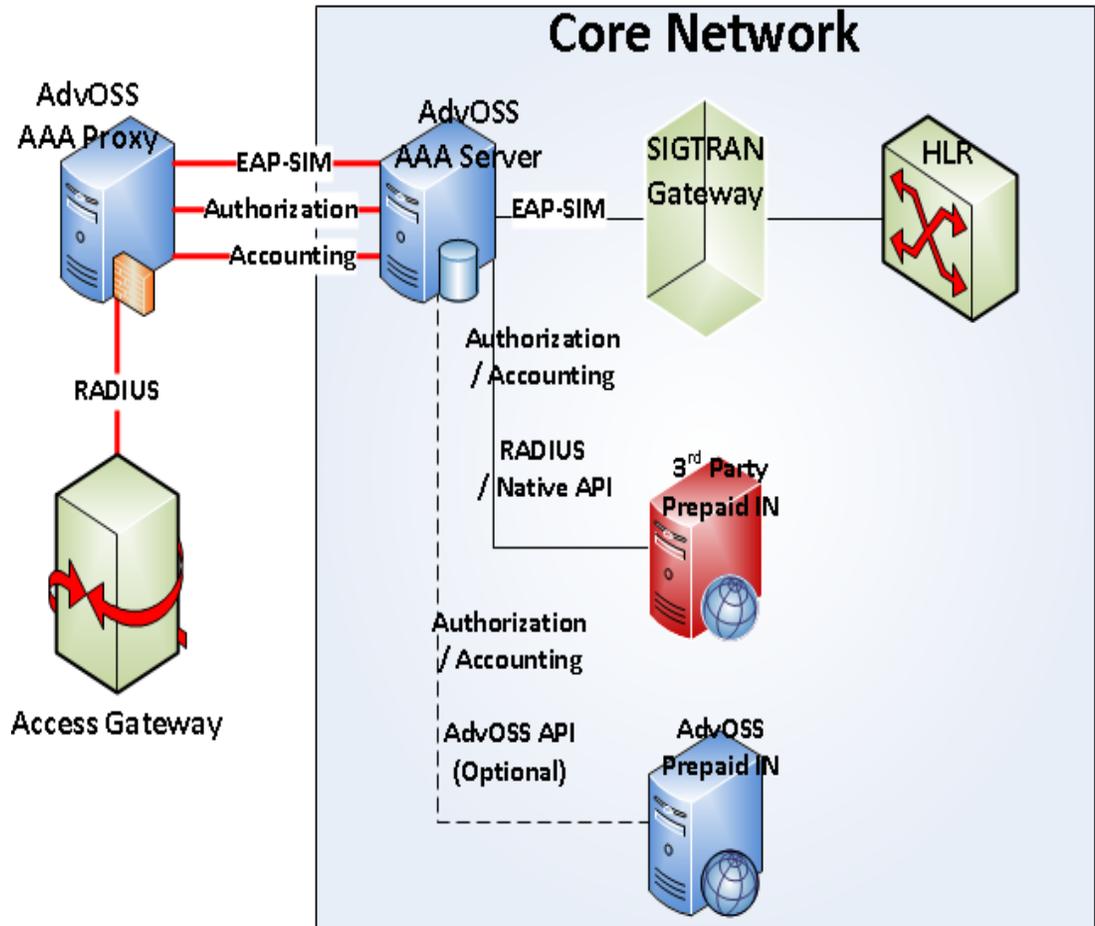
o Provision the user credentials in AdvOSS HSS using the AdvOSS exposed HSS API (Restful web-based API) when the user is provisioned in HLR. AdvOSS AAA server would then perform complete EAP-SIM in a standalone mode using its own HSS data repository without any dependence on HLR or SS7 signaling.
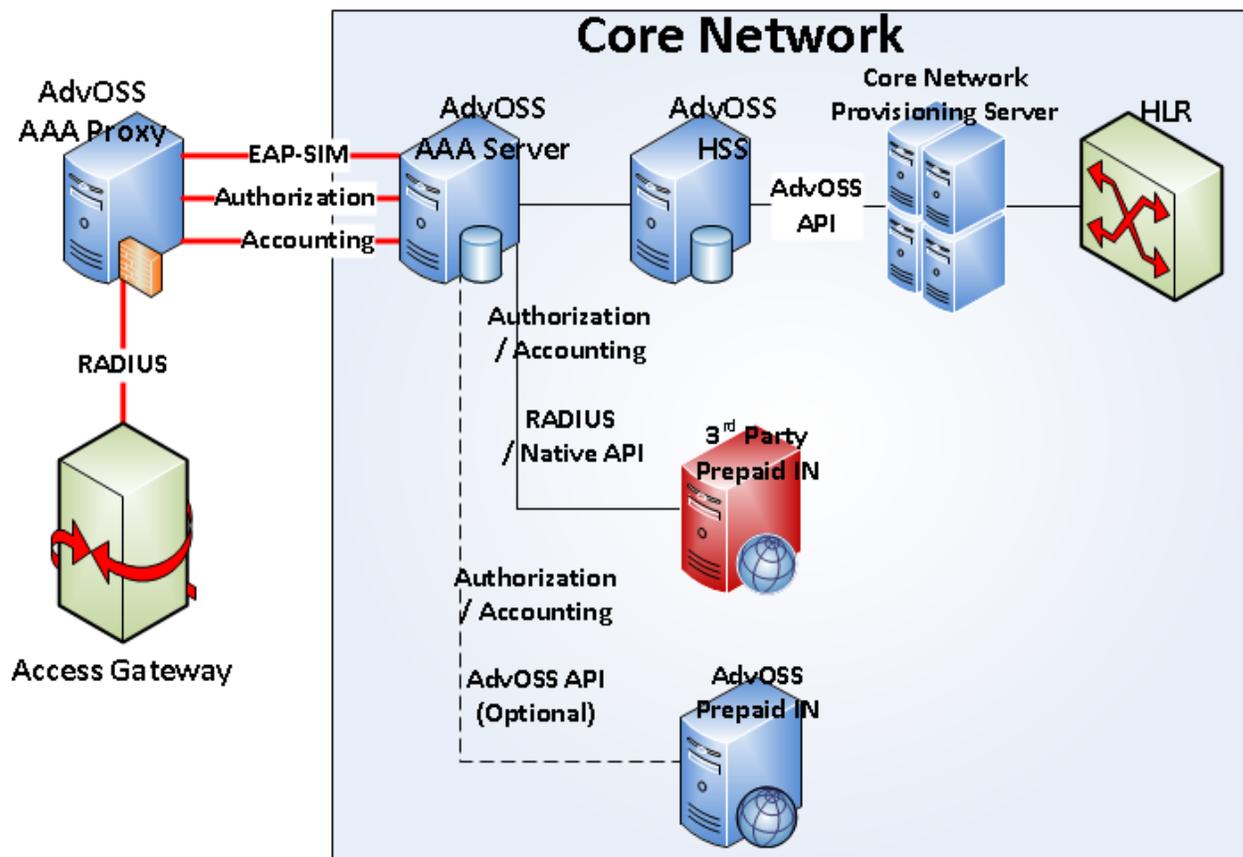
Prepaid Authorization and Accounting using third party prepaid IN

Prepaid Authorization and Accounting depend upon whether the third party system exposes its native API for Authorization and Accounting. If it does, then AdvOSS-AAA server would integrate with the third party system using its provided API to perform real-time Authorization and Accounting.

On the other hand, if the third party system provides a RADIUS interface for Authorization and Accounting, the AdvOSS AAA proxy can route the requests to the RADIUS server of third party prepaid system.

Prepaid Authorization and Accounting using AdvOSS Prepaid IN

AdvOSS prepaid IN comes fully integrated with AdvOSS AAA server whether the AAA is using RADIUS or DIAMETER on front-end.

• In case data traffic is passed through to the core network instead of routing it to the Internet, then there is no Authorization and Accounting required at the access gateway and the system only requires EAP-SIM Authentication for which any of the two options

given above can be considered. Authorization and Accounting is typically performed in the core network using either SS7 or RADIUS/DIAMETER based technologies in GGSN.

Complete 3GPP compliant solution built upon AdvOSS AAA and Service Control Platform

- AdvOSS AAA solution, consisting of AdvOSS AAA proxy and AAA server, whether fully integrated with third party IN through native API or SS7 based HLR via SIGTRAN gateway can be enhanced with the following AdvOSS products to form a complete Service Control Solution:
  - o AdvoSS HSS and integrating it with the existing HLR via AdvOSS exposed HSS provisioning API
  - o AdvOSS policy server interfacing in the core network with GGSN and Deep Packet Inspection (DPI) engines over Gx interface, interfacing with Application Servers in core via Rx interface to provide fine-grained control of subscriber services, QoS and QoE.
  - o The policy server can also use RADIUS interface using Change of Authorization (CoA) if any Policy enforcement points support RADIUS only.
  - o The policy server can use Sp or Ud interface to AdvOSS or third party HSS for subscriber profile updates

- Gx for Policy Enforcement and using proprietary interfaces with CoA to enforce them on Access Gateway if Access Gateway is based on Radius
- Can also use Sp with HSS for subscriber profile changes

Voice offload

Voice offload allows a cellular provider to allow its users to connect to its core over all alternate network topologies. For Wi-Fi enabled handsets, it even allows its subscribers to use its core network while roaming to other parts of the world. Most new handsets come with a SIP client built-in that can be provisioned to send calls to Mobile Core.

Mobile Voice offload solution comprises of the following AdvOSS Products:
- AdvOSS SBC / IMS Server on the border

- AdvOSS SIP Application Server (optional)
- SIP / SS7 Gateway from third party (optional)

Other Industry Names

- Generic Access Network
- Unlicensed Mobile Access