



Tooway Grade Of Service

16-06-2009

SERVICE DEFINITION

Introduction

The Tooway™ service is strictly limited to Internet connections by individual private users. Only 4 levels of services are available. In order to maintain service quality, the satellite provider (NOC) reserves the right to suppress at any time (and for all services) any protocols that are for non-professional use notably Peer-to-Peer protocols. The chosen date for activating a terminal is the date recorded in the OSS of the NOC.

Glossary

DNS = Domain Name System
FTP = File Transfer Protocol
IDU = In Door Unit
IP = Internet Protocol
LAN = Local Area Network
MAC = Medium Access Control
ODU = Out Door Unit
Tooway™ MODEM = Return Channel Satellite Terminal
TCP = Transport Control Protocol
TDM = Time Division Multiplex
TDMA = Time Division Multiple Access
UDP = User Datagram Protocol
FAP = Fair Access Policy
CPE = Customer premises equipment (PC or Macintosh)
NOC = Network Operating Centre.

Basic Service Description

The fixed bi-directional Tooway IP satellite services in Ku and Ka band described below are dedicated to the consumer market and are offered via the Tooway™ system, which has the following principle characteristics:

- Star network topology with a Hub and user terminals (known as *Return Channel Satellite Terminal* or Tooway™ MODEM);
- Asymmetric Full Duplex transmission;
- TDM (*Time Division Multiplexing*) in the direction Hub Tooway™ MODEM (*Outbound, Downstream* or *Forward Channel*)
- TDMA (*Time Division Multiple Access*) in the direction Tooway™ MODEM Hub (*Inbound, Upstream* or *Return Channel*).

Each Tooway™ MODEM can be interconnected: to one user equipment (e.g. a PC or a Macintosh). No additional software is needed in the PC or Macintosh.

Internet Access

The Internet Access Services provides shared bandwidth for Internet access and Web navigation via a two-way satellite terminal (Return Channel Satellite Terminal or Tooway™ MODEM). Each Tooway™ MODEM operates in a star configuration in which the terminals can belong to different Distributors and clients .

The service uses shared bandwidth in the Hub Tooway™ MODEM direction (Outbound, Downstream or Forward Channel) and in the Tooway™ MODEM Hub direction (Inbound, Upstream or Return Channel).

The ratio between Inbound and Outbound bandwidth is pre-determined by satellite provider (NOC) depending on estimates of the traffic generated in both directions by the applications commonly used per service category.

There are four service categories differentiated by the allocated monthly volume and the profile of user traffic foreseen: Basic-Bronze-Silver-Gold.

To maintain service quality, the satellite provider (NOC) reserves the right to suppress at any time (and for all services) any protocols that are for non-professional use, notably Peer-to-Peer protocols such as YouTube, *Kazaa*, *WinMX*, etc., and any other protocol liable to have the same effect on service quality.

| | Basic | Bronze | Silver | Gold |
|---|--|--|--|--|
| Authorized Protocols | FTP, HTTP(s), POP3/SMTP, IMAP, DNS on UDP. | FTP, HTTP(s), POP3/SMTP, IMAP, DNS on UDP. | FTP, HTTP(s), POP3/SMTP, IMAP, DNS on UDP. | FTP, HTTP(s), POP3/SMTP, IMAP, DNS on UDP. |
| Non quaranteed protocols | all others, authorization subject to FAP | all others, authorization subject to FAP | all others, authorization subject to FAP | all others, authorization subject to FAP |
| Terminal to terminal connectivity | NOT ALLOWED | NOT ALLOWED | NOT ALLOWED | NOT ALLOWED |
| IP addresses* | 1 private IP | 1 private IP | 1 private IP | 4 private IP |
| Max download | 3584 Kbits/s | | | |
| Max upload | 384 Kbits/s | | | |
| Limitation of aggregated, weighted download and upload volume for a period of four sliding weeks 0.5 x download volume + 1.5 x upload volume | 2.4 GBytes | 4 Gbytes | 6 Gbytes | 12 Gbytes |
| Minimum contract duration for all the packages | 12 months | 12 months | 12 months | 12 months |

Service definition for HB6 on Ka band.

During the night from 24:00 till 06:00 (GMT/UT) 50% only of the volume is taken into account for the Tooway services.

KA-band will peak up to 512 Kbps at best effort.

When volume passes the volume thresholds, the user will experience lower speed.

Contractual thresholds are defined as a weighted average between forward and return to allow further flexibility to the user.

Calculated on a 1/5 uplink to downlink ratio.

| | Basic | Bronze | Silver | Gold |
|---|--|--|--|--|
| Authorized Protocols | FTP, HTTP(s), POP3/SMTP, IMAP, DNS on UDP. | FTP, HTTP(s), POP3/SMTP, IMAP, DNS on UDP. | FTP, HTTP(s), POP3/SMTP, IMAP, DNS on UDP. | FTP, HTTP(s), POP3/SMTP, IMAP, DNS on UDP. |
| Non quaranteed protocols | all others, authorization subject to FAP | all others, authorization subject to FAP | all others, authorization subject to FAP | all others, authorization subject to FAP |
| Terminal to terminal connectivity | NOT ALLOWED | NOT ALLOWED | NOT ALLOWED | NOT ALLOWED |
| IP addresses* | 1 private IP | 1 private IP | 1 private IP | 4 private IP |
| Max download | 3484 Kbits/s | | | |
| Max upload | 384 Kbits/s | | | |
| Limitation of aggregated, weighted download and upload volume for a period of four sliding weeks 0.5 x download volume + 1.5 x upload volume | 2.4 GBytes | 4 Gbytes | 6 Gbytes | 12 Gbytes |
| Minimum contract duration for all the packages | 12 months | 12 months | 12 months | 12 months |

Definition of the services in Ku band on EB 3.

All services are volume limited. Upon reaching the maximum volume the service will continue but will be de-graded (slower). All subject to the “Fair Access Policy”. *Dynamic private IP.

Annex 2 Fair Access Policy (FAP)

1) Purpose:

The objective of the FAP is to ensure a fair distribution of the available resource of the broadband network to all users, with the focus to provide the best experience of broadband to regular users and to control the resource sharing among the members of a heterogeneous and variable population of users. Please note that all the following values may change following traffic evaluation without further notice.

2) Intended nominal service

When not under FAP conditions (limitations) the user could expect:

1. A minimum of 50% of the peak Speed 90% of the time
2. A Minimum of 20% of peak speed 95% of the time
3. Applications Web Browsing and mail services
4. Very low speed and priority on all peer to peer applications

3) Definition of FAP related expressions:

Connected Terminal:

A terminal that is connected to the network but not always producing traffic.

Active Terminal:

A terminal that is connected to the network and currently produces traffic.

Activity Factor:

The ratio between the number of active terminals and connected terminals.

User – Subscriber – Terminal:

For the FAP one terminal is considered to be connected to one PC for one subscriber or user. The FAP does not consider if there is more than one PC or other device behind the terminal.

GATpS:

“Global Average Throughput per Subscriber” calculated over the whole population of subscribers.

Regular user:

The Subscriber uses the resources in accordance with the standard traffic models and complies with the two following conditions:

- 1) The short-term traffic volume of a single active user is exponentially distributed with consistent average with the service definition.
- 2) The temporal distribution of accesses from active users follows Poisson distribution with rate in accordance with hypotised activity factors.

Over the group of all regular users, the GATpS is specified to 14 kbps with an Activity factor 1/75

Ab User:

These subscribers generate traffic, temporarily or permanent that exceeds the standard models. The FAP is designed to limit three different types of Ab Users

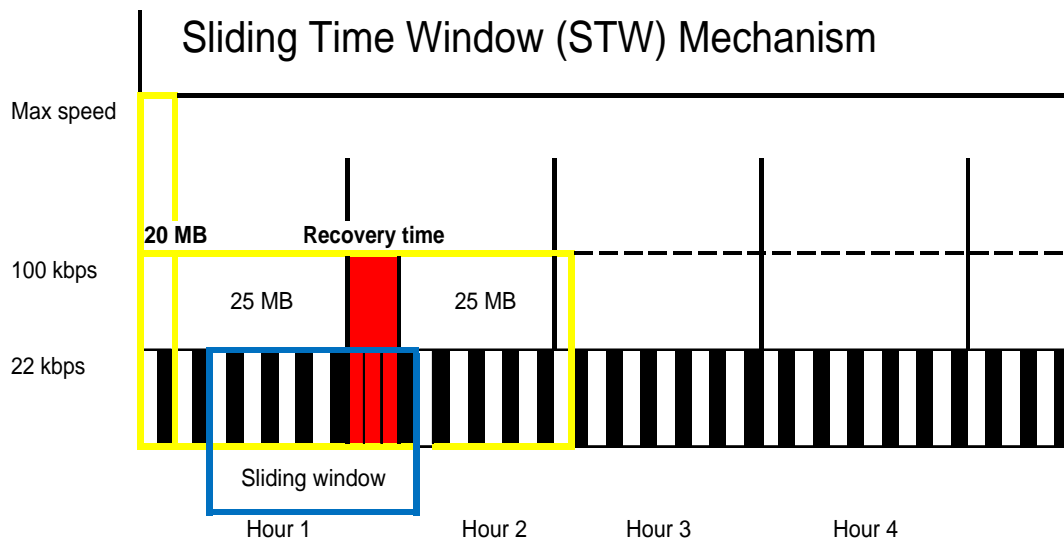
Occasional Ab User: generates a very high traffic volume sporadically. GATpS > 30 kbps and exceed condition 1) mentioned above.

Frequent Ab Users generate traffic exceeding the standard models regularly in specific hours of the day or certain days of the week. Their Activity Factor is > 1/25 and they exceed condition 2) mentioned above.

Permanent Ab Users generate a continuous high level of traffic and exceed condition 1) as well as condition 2) mentioned above. Their GATpS is > 50 kbps and their activity factor is > 1/25.

4) FAP the principle

Depending on the volume of traffic, that each individual user generates, the FAP reduces the available bandwidth of this specific user. The NOC measures the traffic volume in intervals of 5 minutes and makes the Integral of the total volume over a certain period. The current FAP foresees periods in the following called **sliding time window** (STW) of one hour, 4 hours, one day and one week. Should the traffic inside a sliding time window (STW) exceed the volume limit the FAP reduces the bandwidth to the specific user. As soon as the traffic volume of the STW reaches the volume below the limit, the FAP releases the bandwidth limitation.



5) The FAP rules

- FAP is triggered only when the network is overloaded.
- Limits the use of resource done by abUsers by limiting the Volume.
- For each and every User the produced traffic is observed over multiple Sliding Time Windows (*STW*).
- Volume Thresholds (*VT*) are pre-set for each *STW*.
- If the traffic generated by a specific User exceeds any of the defined Thresholds, the relevant *STW* is declared *FAPped* and the Maximum throughput is considerably reduced for that user until the *STW* is no longer *FAPped*.

6) The Fair Information Policy (FIP)

Information given to subscriber:

- Instantaneous real time information (Push)
 - Network congestion (FAP active or not)
 - FAPed or not
 - Punished or not
- Information on a web site (Pull)
 - Account status
 - Remaining Volume / Volume available
 - FAP status