

# CONNECTED BY ALL MEANS

The Ultimate Solution for On-board Passenger Connectivity



## COMPREHENSIVE SOLUTION TO COVER ALL PASSENGER NEEDS

Satellite communication is not only the most cost-effective solution, reducing investment in infrastructure along the rail path, it is also an immediate solution, easily deployed on any train.

Wavestream, a leading provider of satellite communication, offers the most comprehensive solution for all passenger communication needs on board. The solution is based on a reliable, high-speed satellite communication link. Wavestream's solution solves two of the main problems for train operators: lack of cellular coverage in rural areas and the handover problem due to the high speed of the train.

The solution provided by Wavestream is based on an innovative line of products that addresses a holistic environment of communication on board.

### Use Your Mobile Phone On The Move

Thanks to the femto-cell base station located in the locomotive, railway passengers can use their mobile phones for voice and data applications. The solution is scalable to support any amount of concurrent users and supports 2G and 3G technologies.

Providing a complete solution for the cellular operator, Wavestream offers installation at the cellular network and connection from the cellular access nodes located on the train to the switch core of the cellular operator.



### Benefit From High-Speed Wi-Fi On Board

Using the latest Ku and Ka technologies, it is now possible to connect train passengers with a reliable, high-speed and low-cost satellite link so they can surf the net while on the move. The Wavestream solution consists of a smart router that can work with one or more satellite terminal systems on board and can smoothly alter the connection when entering tunnels. Railway companies can use Wavestream's smart diff-serve algorithm to define different service-level agreements (SLA) for different passengers' classes.

## UNDERSTANDING YOUR BUSINESS

As a solution provider for passenger connectivity in trains, we understand that your business is to operate the trains. To help our customers focus on their core business while enhancing passengers' experience during travel, Wavestream offers an end-to-end solution.

### Our solution is based on the following services:

#### Installation

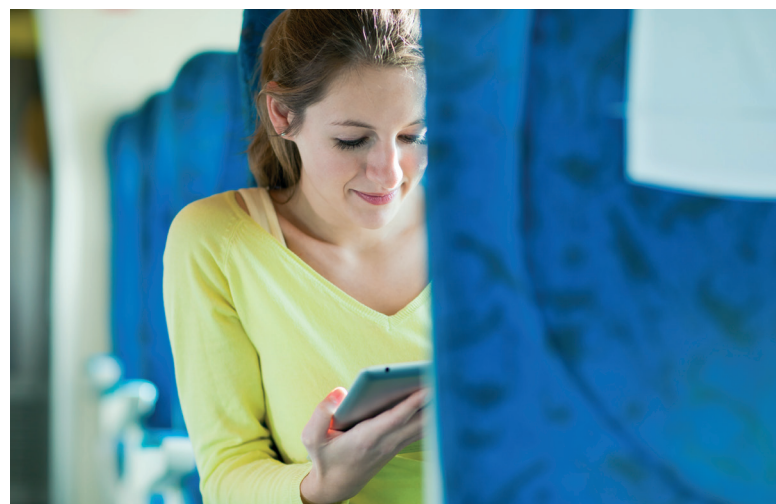
Working with leading partners with vast experience installing equipment on trains, Wavestream offers full turnkey solutions. From deploying access nodes, a mobile cellular base station and satellite terminal up to an equipment installation at ISP and cellular operator premises, Wavestream takes full responsibility for the entire network.

#### Satellite Link

Railway operators, internet service providers and cellular companies can benefit from Wavestream's extensive business relationships with satellite operators. Wavestream offers a satellite connectivity package with the most attractive rates and availability. ISPs and train operators can leverage Wavestream's existing network of hubs worldwide to reduce CAPEX in locations where Wavestream has already installed a hub.

#### NOC-As-A-Service

Enjoy the support of Wavestream's expert teams to monitor and control your satellite network. Providing 24/7 service, our network operation centers (NOCs) support any network worldwide. As part of our NOC-as-a-Service offering, Wavestream takes full control of the satellite segment and makes sure it is 100% operational at all times.



### Global Service Support

With dozens of sales and support offices worldwide, you can rely on our trained teams to support any situation regardless of the time and location. Wavestream's four-level tier support takes action and restores equipment to service in minimal possible time. Based on your needs, we offer different service level agreements.



## BENEFITS

- **Constant connectivity solution for high-speed and intercity rail**
- **Passengers can use their mobile phones for voice and data applications throughout the trip**
- **Low-profile, high gain antenna meets tunnel height constraints**
- **Smart algorithm optimizes network utilization and overcomes satellite delay**
- **High-speed signal reacquisition enables fast resumption of availability when exiting tunnels**

## ALWAYS CONNECTED

High speed trains traveling between major cities often compete with airlines. In recent years, airlines companies have started to deploy internet connection on board, a trend which is rapidly accelerating.

Train passengers are no different than airplane travelers in their connectivity needs, especially when they are captive for an hour or more during travel. Studies show availability of an internet and cellular connection are one of the major criteria in choosing whether to fly or take the train.

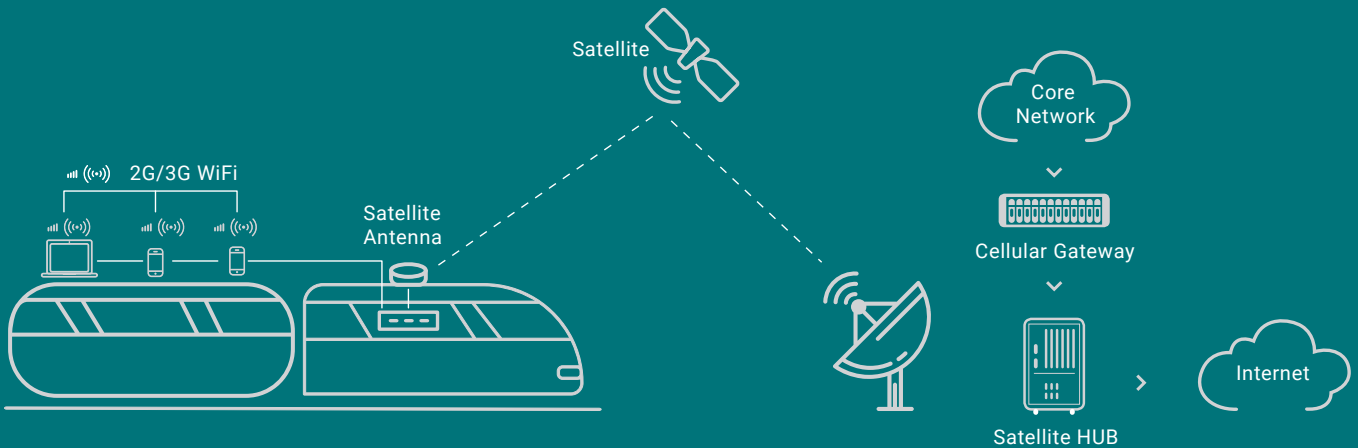
People want to be connected. It doesn't matter if they're on their coffee break or on the move. As long as they carry their mobile phone, tablets or laptop, they will be looking for a reliable connection.

High-speed railway passengers often discover that their mobile phone just doesn't work on board. The high speed of the train leaves a very short interval for handover between cellular nodes, preventing a voice call or data link connection.

In addition, in many cases intercity travel suffers from lack of cellular coverage along the railway path, especially where it travels through rural areas.

The only reliable solution that can meet both high speed and lack of rural coverage is satellite communication.

## FULL WAVESTREAM SOLUTION FOR TRAIN CONNECTIVITY



### A Closer Look

Wavestream offers two VSATs built especially for the train market. The ER-7000 and the ER-5000 modules are low-profile, high-gain antennas based on Wavestream's patented technology. The high-acquisition mechanism embedded in both products enables the market's fastest re-acquisition whenever the train leaves a tunnel. This enables a smooth reversion to fully operational mode with little to no disruption in the passenger experience.

Access nodes are installed in all cabins and are connected via ethernet to a modem located in the locomotive. This enables railway operators to switch cabin cars as needed while retaining connectivity. Thanks to the FTP acceleration algorithm embedded inside the modem, Wavestream also overcomes the inherent problems of long-delay satellite connection.

With over a million modems connected to hundreds of hubs worldwide, Wavestream provides you a tested, reliable product that ensures a high-speed train connectivity link – in any climate and at any speed.

### ABOUT WAVESTREAM

Wavestream sets the standard in the design and manufacture of next generation high power solid state amplifiers. Wavestream's Family of Ka, Ku and X-band Solid State Power Amplifiers (SSPAs), Block Upconverters (BUCs) and transceivers provide systems integrators with field-proven, high performance solutions designed for ground mobile and fixed, gateway and airborne satellite communication systems worldwide.

These items are subject to the Export Administration Regulations (EAR), 15 C.F.R. Parts 730-774, and may not be exported or transferred to any non-U.S. person, except as authorized by the U. S. Department of Commerce

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