



# Hybrid networks for communications **on the move**

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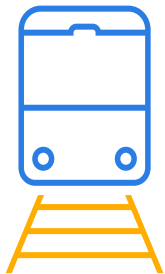
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hispasat<sup>•</sup>

# 01. Introduction



# 01. Introduction

## About HISPASAT



**Satellite Telecom operator** with a strong presence in the Iberian Peninsula and Latin America.



**Robust positioning in high-growth markets**, with a well established based of strategic clients..



**Leading content and connectivity services distributor** in Spanish and Portuguese speaking countries.



**Main telecommunication bridge** between Europe and America.

hispasat

Reference shareholders of proven strength with the support of the Spanish Government.



**8<sup>th</sup> world operator**, with more than 25 years of experience.. **4<sup>th</sup> income satellite operator** in Latin America



**More than 1,300 TV and radio channels**, and capacity to provide end to end video services.



**Booster of the Spanish aerospace industry.**



# 01. Introduction

## Satellite Fleet

9

### SATELLITES IN ORBIT

74°O

H74W-1

INTELSAT  
ALLIANCE

70°O

H70W-1

STAR ONE  
ALLIANCE

36°O

H36W-1

61°O

AMZ2

AMZ3

AMZ5

30°O

H30W-5

H30W-6

45/56

SPOT BEAMS\*\*  
KA BAND

>260

TRANSPONDERS\*  
IN BAND C AND KU

\* TXP equivalent 36MHz  
\*\* 45 nominal Spots beams

74° 70° 61° 55.5° 36° 30° 0°



The Amazonas Nexus satellite will enter service in Q2 of 2023.

# 01. Introduction

Porfolio



INTERNET ACCESS



HOTSPOT WIFI



TELEDUCATION & TELEMEDICINE



BACKHAUL & IP TRUNKING



MOBILITY



EMERGENCY



IOT



# 02. Mobility Services

Land - Potential markets



RAIL TRANSPORT



PUBLIC TRANSPORT



FREIGHT TRANSPORT

# 02. GENERAL DESCRIPTION

## Satellite Solution



### CHARACTERISTICS

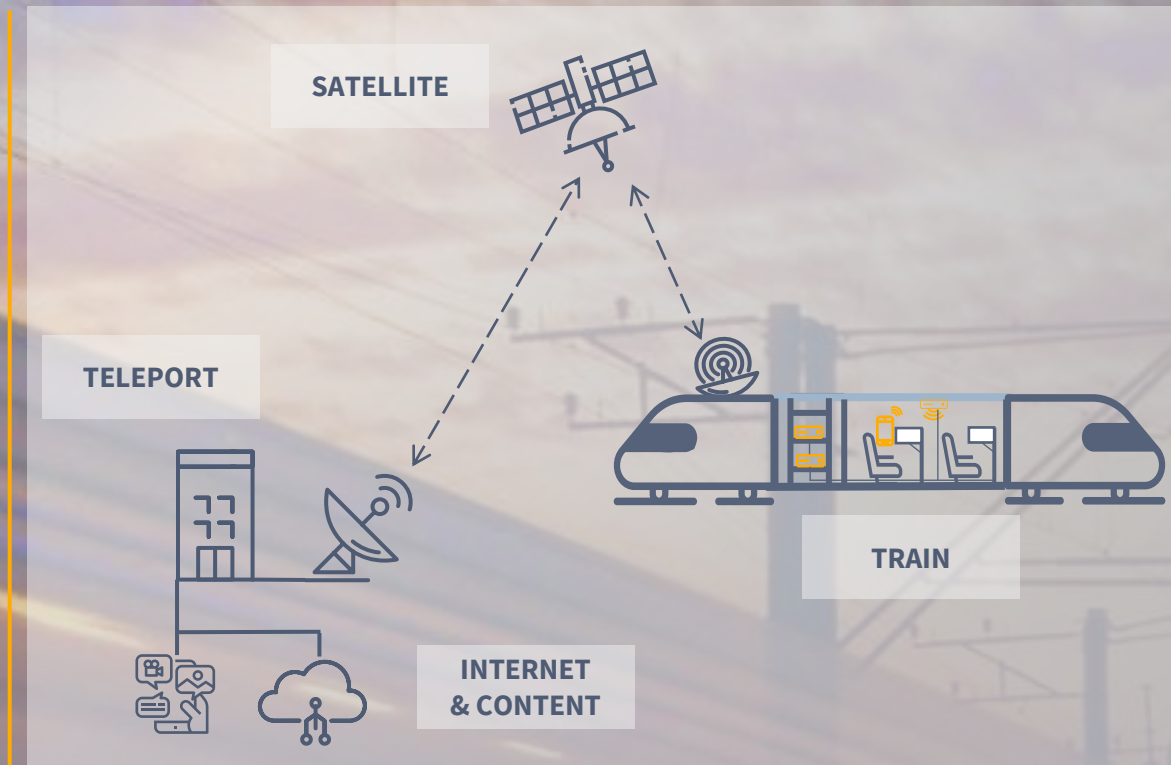
Innovative technology including new generation satellite antenna designed and certified for railway environments. Onboard services: Internet access for passengers, Video on Demand, Multicast TV, entertainment and corporate services, etc.



### OUR EXPERIENCE

More than 25 years deploying connectivity on trains with companies such as NTV, Thalys fleet and Renfe.

## ARCHITECTURE



# GENERAL DESCRIPTION

Satellite Solution

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**Hispasat collaborate in the operation of the 96 RENFE's high speed trains in Spain.**

First trains installed have been working for over 5 years, delivering services to the passengers such as: Internet connectivity, Video Streaming, Multimedia Contents...

Hispasat is always dealing with manufacturers of the various equipment that compose the Satellite Solution (Antenna Subsystem, RF Subsystem and Baseband Subsystem) to improve the complete Solution and offer the **latest "State of The Art" technology.**

Antennas with **better G/T and EIRP** performance allow **higher efficiencies**, which implies that the train could achieve **higher throughput.**

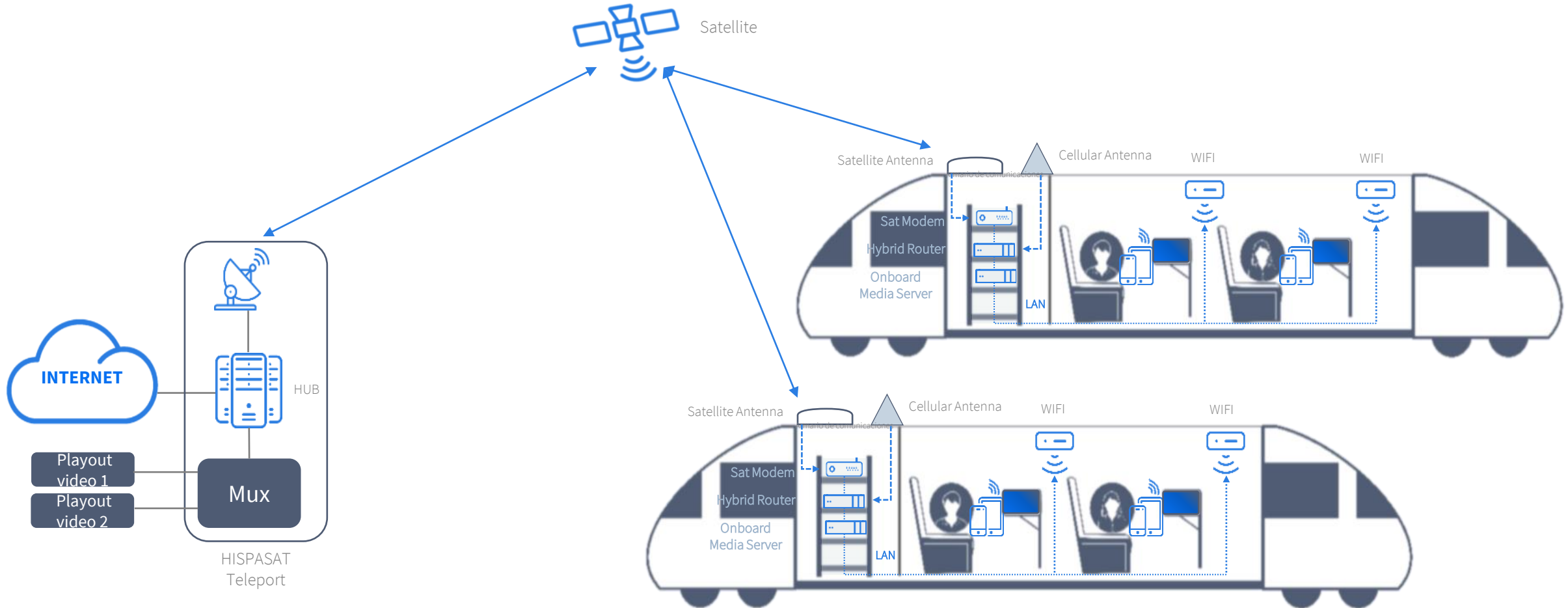


(1) Flat Panel Phased Array with mechanical pointing in both axes.



# GENERAL DESCRIPTION

Connectivity service will be provided to the train with a Satellite-Cellular Hybrid Architecture. The onboard media content and TV will be distributed inside the trains with a WiFi network. The figure below shows the diagram of both services:

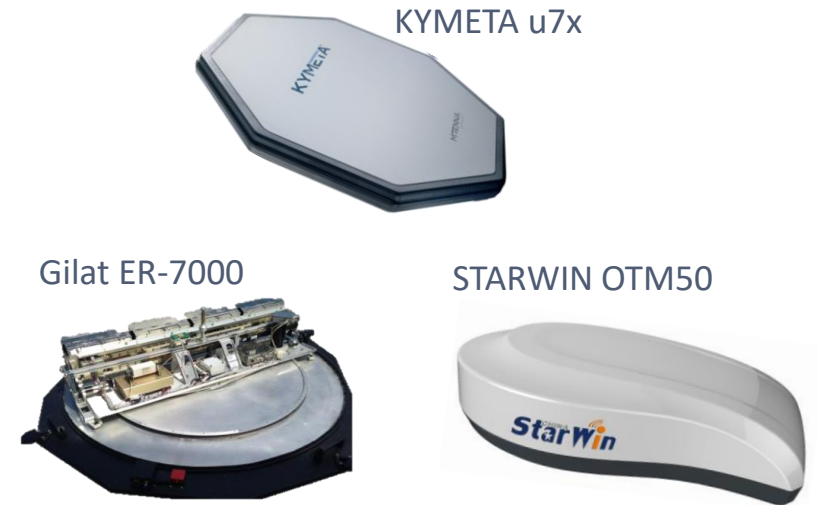


# Connectivity and onboard media content for trains

## Satellite antenna

Next table summarizes the features of the Satellite antennas, according to the RFP results with antennas manufacturers:

	<b>GILAT ER-7000</b>	<b>STARWIN OTM50</b>	<b>KYMETA u7x (x2) <sup>(1)</sup></b>
Type	Electromechanical	Electromechanical	Electronic
G/T (dB/K)	11,8	11	7,5
EIRP (dBW)	42	42	44
Height dimensions (cm)	30	27	17
Weight (Kg)	59	45	21,1

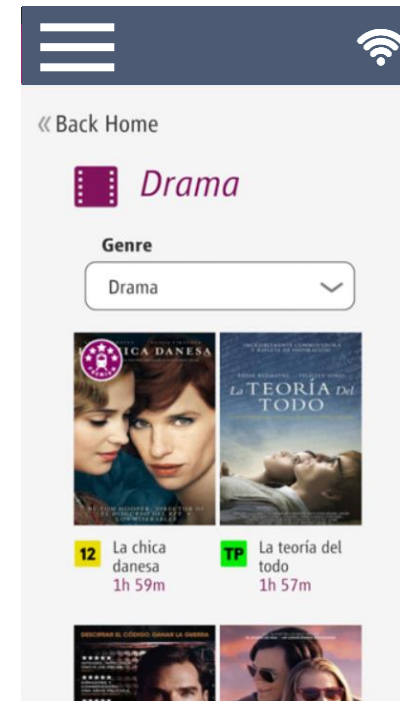
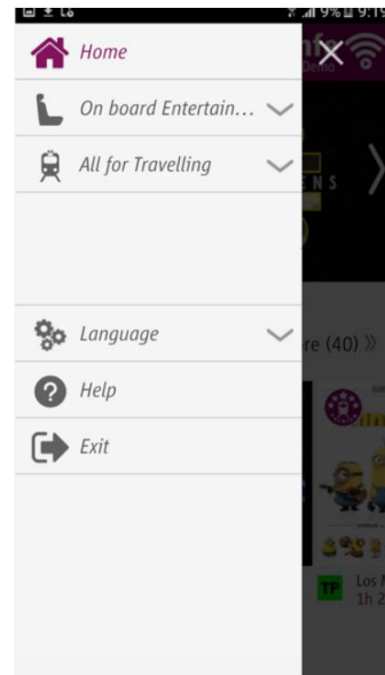
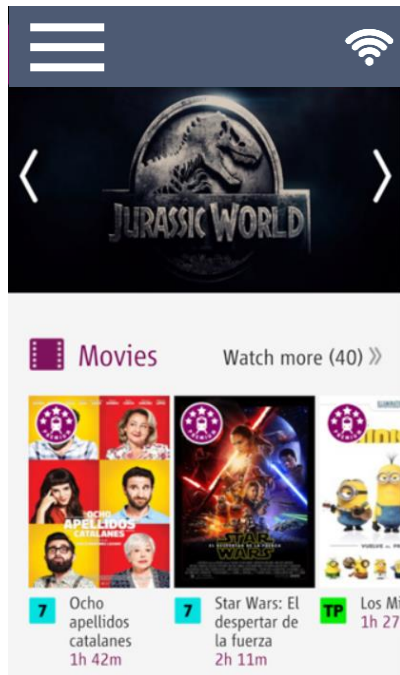


# GENERAL DESCRIPTION

Web Portal

The onboard services are presented to passengers in the form of a portal. The commercial offer on board is accessible through an app developed to access a great number of digital contents and services, even including multicast live TV. Contents of the Portal may include quality films, series and a specific section for kids (monthly renewal).

## Web Portal example:



# 03. Hybrid Solution

## Advantages



### Agnostic Solution

The solution allows the aggregation of satellite and cellular traffic **from different mobile operators**.

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### Easy Deployment

Immediate availability - no additional ground infrastructure deployment required

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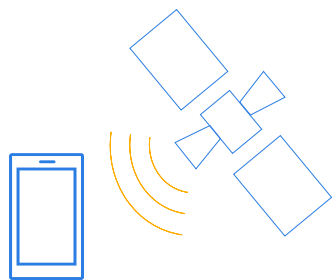


### Cost efficient

Reduces deployment investment. No need to invest in cellular infrastructure dedicated exclusively to railway branches.

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# Hybrid solution



# 03. Hybrid Solution

## Technological evolution

HISPASAT has developed a solution that includes a series of evolutions with respect to the current connectivity service provided for the high-speed trains.

### Main new features:



#### Ka Band Solution

- Ka-band satellite capacity: improved global network performance.
- Higher speeds >100Mbps
- High performance antennas
- Improved connectivity price reduction of 50%.



**Traffic aggregation:** The guaranteed satellite capacity will be complemented by the cellular networks available on each route (multi-operator).



**Advanced monitoring functions (geofencing):** prioritisation by trains, routes or applications

# 03. Hybrid Solution

## Solution components



### The solution includes

- Satellite & cellular capacity.
- Access technology (antennas, modems, etc...).
- Routing & traffic aggregation systems.
- Wifi network distribution in cars.
- Network operation and maintenance.

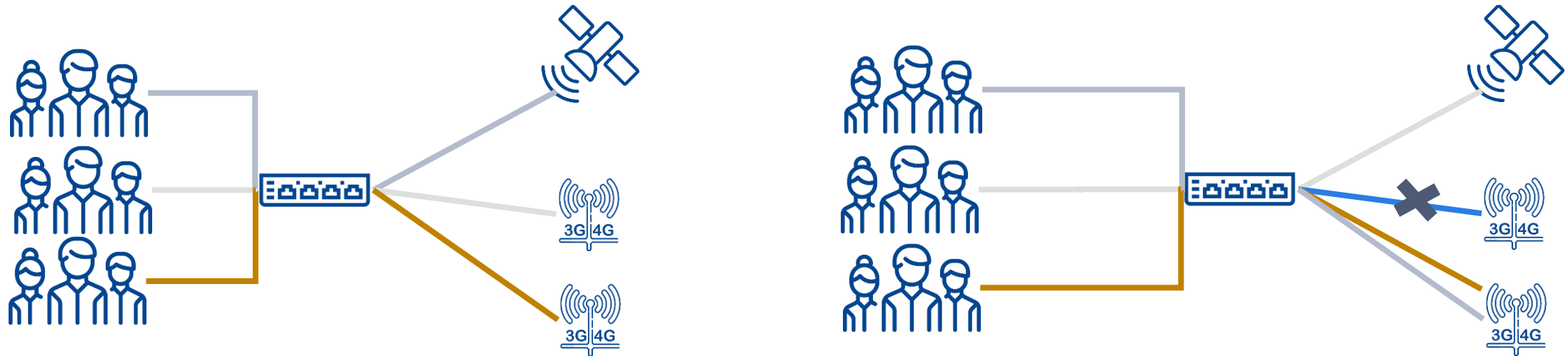


# GENERAL DESCRIPTION

## Introduction Hybrid Connectivity

**Load Balancing** is the ability to **balance the traffic** (Internet/corporate) **through two or more WAN** (Satellite and cellular networks) links, thereby **increasing the total amount of available throughput**, as well as to **provide network redundancy** in the event of the failover in WANs.

The **traffic and the users will be balanced dynamically**. This process is transparent to the passengers.

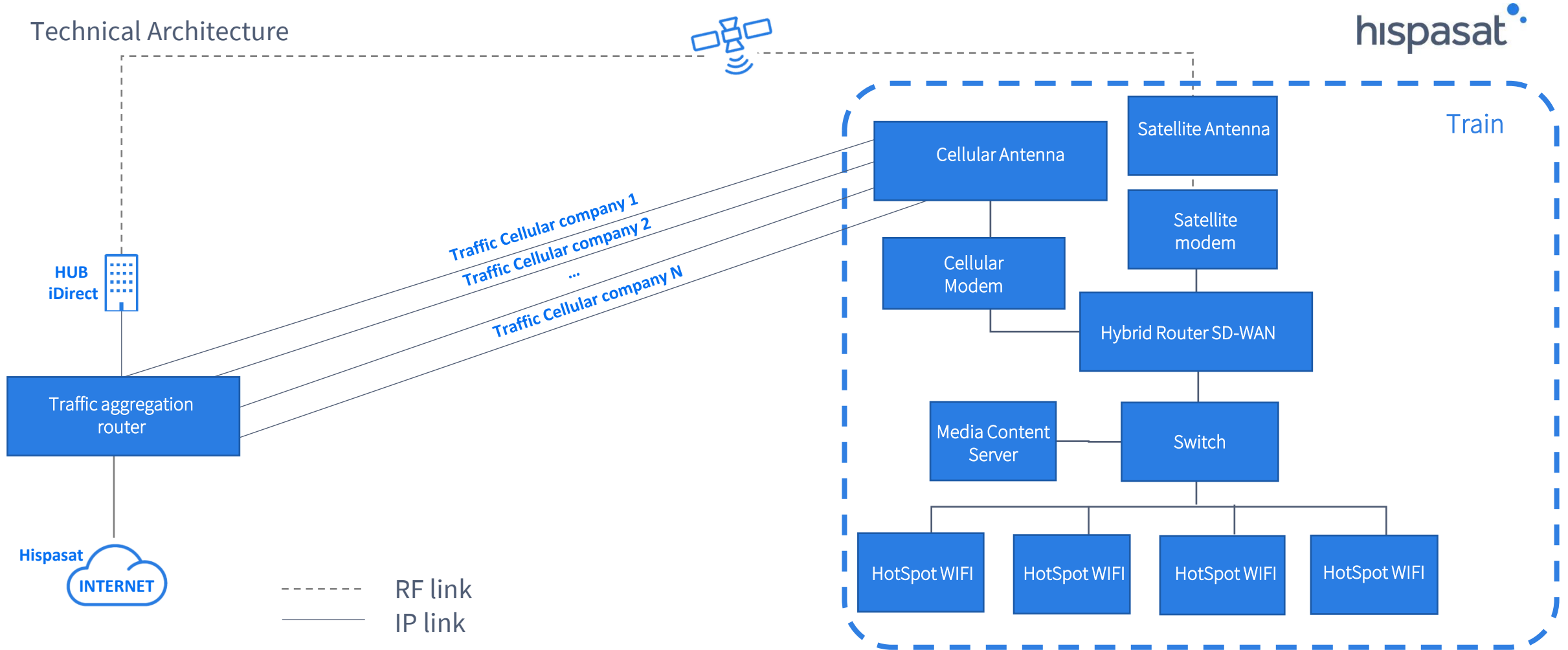


The **Hybrid Architecture** will **increase the availability** of the system with max throughput. The **satellite will provide global coverage** where cellular networks have limited coverage.



# GENERAL DESCRIPTION

## Technical Architecture



The Hybrid Router could prioritize the traffic on each WAN depending on the type of traffic carried (e.g. VoIP, browsing, other applications with latency constraints...)



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