## // Datasheet

# Cellular broadband solution for cruise ships

Cruise ship operators are increasingly turning to **cellular broadband** near shore to satisfy the ever increasing demand for high quality connectivity with least cost. Over the past few years, cellular connectivity prices have declined while cellular coverage and speeds have improved. Besides high latency, VSAT has limitations such as blackspots and redundancy issues, which impact guest experience negatively.

Depending on the cruise ship itinerary, cellular broadband connectivity is **available 50-90%** of the time and could be used to **improve the onboard Wi-Fi quality** for passengers, rather than only as a backup solution for VSAT.

**93,7%**
internet availability
on an example North-Sea
itinerary

Signal strength
01-31 March 2022

# VSAT Challenges

### /// Lack of bandwidth

No matter how much VSAT bandwidth one is able to contract, there always seems to be a need for more. More often than not, the bandwidth allocation for a region is also shared by multiple ships, meaning that the available bandwidth is variable. Lack of bandwidth means that certain content (ie social videos) are blocked or pixilate while playing.

### /// High latency

Perceived speed of web browsing depends more on the connection latency than available bandwidth. VSAT latency is always very high compared to all other modes of connectivity.

### /// Outages

Geographical obstacles, bridges, buildings, human error as well as technology failures cause VSAT outages. In the latter two cases these are hard to troubleshoot and fix by onshore teams.

### /// Missed revenue

Many cruise lines charge for the onboard Wi-Fi, in which case the VSAT challenges contribute to reduced ancillary revenue potential.

### /// Guest satisfaction

Even if onboard Wi-Fi is free, its perceived disparity with at home connectivity quality reduces guests satisfaction with the cruise experience.

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# Cellular broadband solution

To overcome VSAT challenges, cruise ship operators have started to invest in cellular Internet broadband.

**Cellular can be used either as:**

1) backup connectivity
2) VSAT capacity spillover
3) concurrent enhancement of VSAT, as cellular connectivity is available 50-90% of the time depending on the route/itinerary.

Many vendors and system integration providers have brought to market cellular connectivity products for cruise ships. All such products provide the benefit of lower latency and increased bandwidth.

# Cellular broadband solution

RebelRoam has developed a **cellular broadband solutio**n with integrated antenna modems, bandwidth bonding and remote SIM management **specifically for the cruise ship market**. Our approach offers distinct benefits to the cruise operator.

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### /// Coaxial cable free integrated outdoor antenna modems
– Reduced time of installation, as the existing ethernet cabling backbone can be used
– No signal loss in the long coaxial cable runs, resulting in better performance of cellular modems
– Increased freedom regarding the installation location (i.e., at every corner of the ship) that results in better cellular signal reception and increased possibility of establishing connection with multiple cellular towers simultaneously, thus resulting in better performance of cellular modems
– Up to 13 cellular modems per cruise ship, resulting to increased available bandwidth
– LTE-A and 5G global modems for increased performance and global coverage

### /// Remote SIM card management
– Solution for remotely (over the air) assigning local/regional SIM cards to the cellular modems, resulting in reduced connectivity cost, multi-carrier connectivity and better performance
– SIM cards are hosted and managed by RebelRoam, resulting in cost management assurance and one invoice. No need to procure, swap and manage SIM cards when ship itineraries change. No more problems with limited data plans, as SIM cards are swapped automatically. No cost overruns or risk of high roaming charges
– RebelRoam will automatically assign different or best performing cellular operator to every modem, thus further ensuring that maximum available bandwidth can be utilized at a given ship location

### /// Enterprise network grade solution
– Active/standby hot failover setup of the onboard load balancer devices that distribute the bandwidth usage among the cellular modems ensures automatic failover in the case of device/network outages
– Support for the onboard Layer 3 network architecture, where modems can be connected to the onboard load balancing devices over GRE tunnel in Layer 3 network architecture, if required

### /// Bandwidth bonding and SD-WAN
– Support for bandwidth bonding and SD-WAN, to ensure unbreakable per packet load balancing among all available healthy cellular/VSAT connections with the side benefit of aggregating the bandwidth
– Support for encrypted site-to-site and multi-site SD-WAN tunneling

### /// Least cost / best performance routing
– Bandwidth heavy applications (social media, video/audio streaming) can be preferentially steered to VSAT and latency sensitive web browsing to cellular broadband, if available

### /// Remote management and reporting portal
– Zero configuration deployment of hardware with fully centralized individual and bulk deployment of configuration and firmware updates
– Connectivity quality and bandwidth usage reporting in real time as well as historically
– Segregated portal user access rights, immutable change log and two-factor authentication for increased, enterprise grade security

# Solution description

RebelRoam usually implements a **Peplink Balance SD-WAN gateway** (or two in hot failover mode) on every cruise ship. Such a gateway is connected to the onboard L2 or L3 LAN networks and to the onboard satellite and cellular broadband gateways. Peplink Balance is **rule based configurable** which enables it to define the onboard networks and types of traffic that should use the available VSAT and/or cellular bandwidth - and when to switch between connections. It is possible to configure the network such that the ship operations (office) network is always using existing VSAT connectivity and that the guest network uses cellular broadband when available and VSAT for failover.

It is also possible to preferentially steer bandwidth heavy applications (social media, video/audio streaming) to VSAT and latency sensitive web browsing to cellular broadband. Peplink can enable granular bandwidth allocation and QoS settings. More importantly it is possible to **maintain unbreakable guest network connectivity over multiple modems** (2+n) without the overhead of aggregating multiple tunnels by utilizing the load balancing algorithms developed by RebelRoam.

Connected to the Peplink Balance SD-WAN gateway, RebelRoam deploys Peplink MAX HD Dome integrated IP67 outdoor cellular modem/antenna solutions. It is possible to connect **1+n (up to 13) HD Domes** to Peplink Balance in order to achieve the required target bandwidth. Single HD Domes can be equipped with a virtually unlimited number of remotely hosted SIM cards, making the ideal solution for cruise ships that need **worldwide, least cost optimized local and/or roaming connectivity**. The HD Domes integrated high performance LTE-A and 5G antennas minimize the installation costs and antenna cable signal losses. HD Domes can be pole-, wall- or roof mounted and require only ethernet cable routing to the central networking room for connectivity and power (PoE).

By deploying custom steerable local and roaming M2M SIM cards in conjunction with multi-modem router solutions, RebelRoam delivers bandwidth from multiple mobile operators simultaneously, resulting in **maximum bandwidth and superior geographic coverage**. Combining Peplink's hardware with RebelRoam's advanced traffic management and straightforward administration result in a high performance Internet broadband solution for cruise ships.
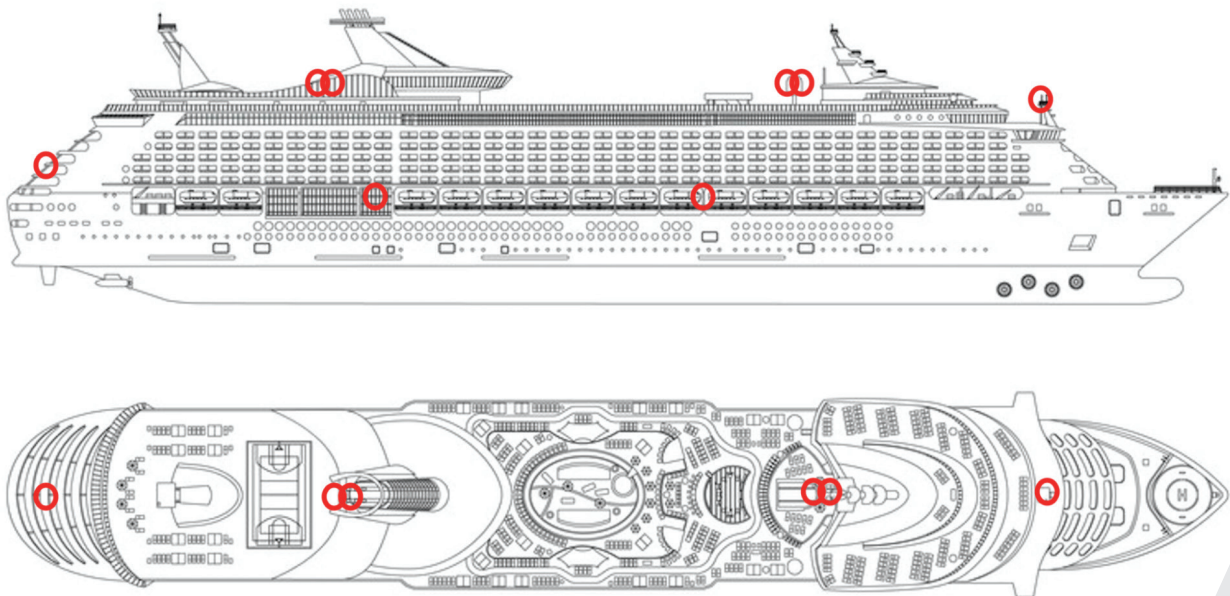


Example RebelRoam outdoor cellular modem/antenna installation on a large cruise ship. Distributing the antennas maximizes cellular signal strength and enables the use of multiple cellular tower cells simultaneously.

# RebelRoams experience

RebelRoam has done over 500 cellular broadband installations for its road and maritime customers over the last 6 years. The full scope solution includes global cellular data SIM cards, onboard equipment administration, data traffic optimization, and Peplink onboard integrated antenna modems as well as load balancers. We understand how critical it is for the performance of onboard cellular modem equipment to eliminate the antenna cables and to optimize the communication protocols for the best performance and return on investment.

## //// Enhance your guest experience and increase ancillary revenue with RebelRoam cellular broadband. ////
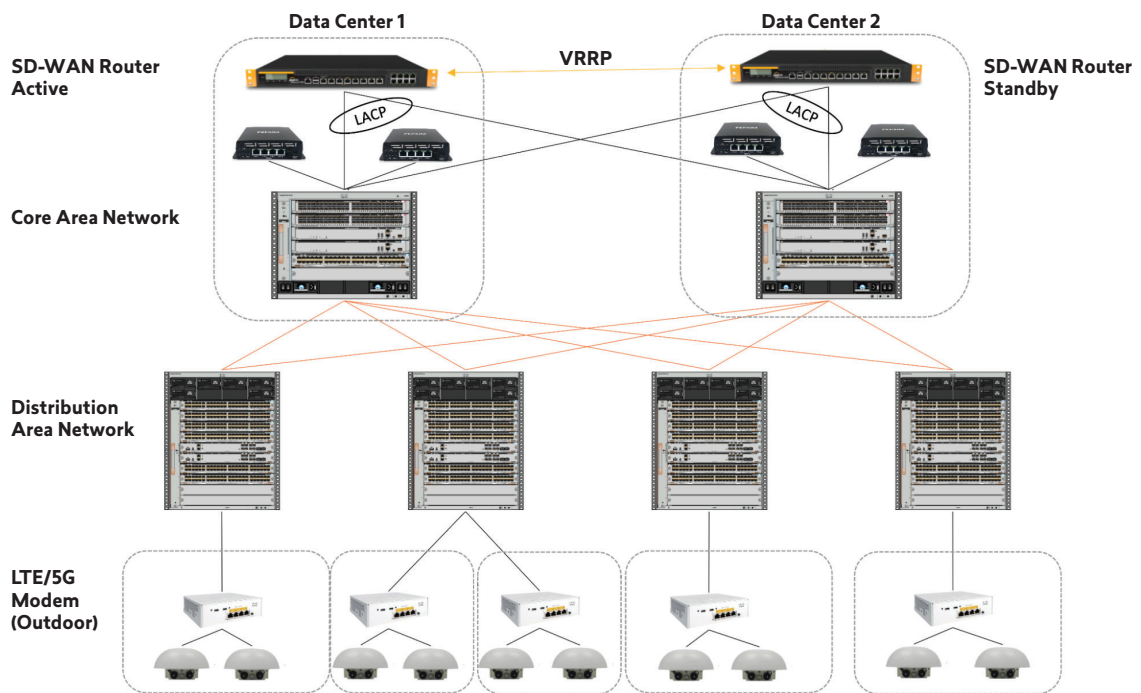


Example RebelRoam cellular broadband network diagram on a large cruise ship.

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