

MTN's VSAT service can now be accessed via WiFi throughout *Splendour of the Seas*



Cruise ships are employing IT to optimise passenger services

Royal Caribbean International's (RCI) *Splendour of the Seas* recently emerged from drydock at the Navantia shipyard in Spain as the first cruise ship to feature iPads in all staterooms. Passengers will be able to access the onboard events programme and their personal daily itineraries, monitor their onboard account, order room service, view restaurant menus, access the Internet and watch movies on these devices.

Furthermore, MTN Satellite Communications' (MTN) onboard WiFi network was upgraded to enable passengers to access the Internet anywhere on the 264m-long ship through the C-band VSAT. RCI senior project manager, Petteri Keso, says, "We previously had Internet access on board but it was just in select hotspots. Now it is pervasive."

MTN's senior vice president and general manager for the cruise and ferry sectors, Brent Horwitz, comments, "Royal Caribbean has some very ambitious plans to upgrade all of its fleet and it is looking at *Splendour of the Seas* as a test bed for a number of different solutions. We upgraded the onboard infrastructure to accommodate large amounts of bandwidth. For at least a test period it may have as much

Both passenger and crew Internet enhancements are helping to make one cruise ship the technological leader in its fleet

by Clare Nicholls

bandwidth as the largest cruise ships yet built, RCI's *Oasis of the Seas* and *Allure of the Seas*."

For MTN, this type of retrofit poses no infrastructural problems. "The ship was only using a fraction of our system's capabilities. We were able to provide equipment to accommodate a more robust system on board but for the most part we are able to carry out upgrades remotely through a keystroke," says Mr Horwitz. "The ship sails between seven of our satellite beams so we were easily able to carry out this kind of request for them."

MTN will also provide C-band VSAT services to Costa Cruises' new ship *Costa Fascinosa*, delivering from Fincantieri's Marghera yard in spring. "We are delighted as this is the first Costa ship we have been awarded. It was the only brand in the

Carnival Corp group that we previously had not supplied," Mr Horwitz explains. *Costa Fascinosa* will have a 2.4m C-band antenna and a 1.5m Ku-band antenna installed. "The benefit there is the ship will be able to circumnavigate the globe while having coverage in both bands," he adds.

As cruise ships are typically large vessels, supplying high bandwidth through both C-band and Ku-band frequencies is straightforward. "Almost every cruise ship has the real estate for a C-band 2.4m antenna or a smaller 1.0m to 1.5m Ku-band antenna," Mr Horwitz says. "Many cruise ships are now employing hybrid solutions that utilise multiple frequencies and we expect this will continue."

Mr Horwitz also reports that cruise ship owners have zero tolerance for downtime. "The requirement for connectivity is the same as a land-based resort. The communications infrastructure now influences whether vacationers decide to cruise or stay on land so what we are seeing across the board is that demand for bandwidth is growing and cruise lines are investing in this. MTN and cruise lines have carried out surveys which indicate that passengers want to escape their day to day responsibilities

but remain connected to the outside world." To mitigate blockage, MTN offers multiple satellite options for different satellite look angles.

MTN is providing higher committed information rates (CIR) to cruise lines, ie, the minimum bandwidth commitment. When there is excess bandwidth on the network, MTN allows its customers to 'burst' – to use more than the minimum CIR. "We have all the statistics and we know exactly how much bandwidth is going to be required to deliver a contemporary Internet experience," says Mr Horwitz. "We always make sure we have enough bandwidth to enable bursting as well as the minimum CIR commitments.

"As on *Splendour of the Seas*, more mobile devices are on board and many cruise lines are investing in more wireless infrastructure. RCI's vice president of IT told me that their goal is

to have five bars of mobile phone reception on every cabin's balcony. That is the kind of connectivity experience they want to offer."

There is also demand for onboard content such as television. In 2011 MTN launched its Worldwide TV service, which provides seven standard channels and one live special events channel. "We are looking to expand this to show more international sports and entertainment content and multiple languages. Our plan this year is to enable passengers with iPads to view TV content through a WiFi network wherever they are on the ship," Mr Horwitz says.

On the crew communications side, MTN is developing a low bandwidth video calling solution. "Cruise ships almost always operate in a time zone that is wildly different from their crew's home one, so most of the time crew are able to speak

with their families at an off-peak time that doesn't impact passengers. We are trying to deliver enough bandwidth and solutions at a low enough price that crew are not going to seek substitutes such as land-based Internet cafés," Mr Horwitz adds.

How onboard Internet usage is charged is changing. Historically it has been based on a price per minute structure, but many cruise ship owners are moving to a price per megabyte tariff. Mr Horwitz says, "This cost structure will govern how much data passengers or crew will download. If cruise lines pay by the minute there is a lot less sensitivity to managing the bandwidth."

One of the ways MTN is aiming to deliver more content for an economical cost is by researching the latest compression, caching and optimisation devices. It is also investing in technology to optimise bandwidth utilisation. **MEC**

Trim and hull monitoring helps owners cut costs

Cruise lines are attempting to optimise the operations of their ships to reduce costs. Finnish technology company Eniram works with a number of cruise ship owners to assist in this aim, providing monitoring systems which can track parameters such as trim, hull condition, sea state and wind. Among its customers are Norwegian Cruise Line, Celebrity Cruises, Carnival Cruise Lines, Holland America Line and Royal Caribbean International (RCI). RCI's *Splendour of the Seas* had Eniram's Dynamic Trim Assistant (DTA) and Fleet Performance Manager (FPM) tools installed in 2011. In total Eniram has carried out around 50 cruise ship installations, with a further 20 underway.

According to Henrik Dahl, Eniram's chief technology officer, "The cruise sector has always been our key development partner. Our first DTA trial in 2007 was on a cruise ship and the FPM tool was developed for the needs of the cruise industry. We have a very close connection and good co-operation with cruise lines."

DTA finds the optimal trim for the prevailing conditions by monitoring a vessel's attitude dynamically at sea and collecting data from the automation and navigation systems. Based on the collected parameters DTA optimises a vessel's propulsion power consumption. "On cruise vessels DTA saves an average of 2 per cent of fuel. At today's fuel prices that's over US\$300,000 annually per vessel," comments Mr Dahl.

FPM uses the modelling of the propulsion information to monitor hull resistance through the water. This directly correlates with hull fouling levels. "Without measuring the fouling itself we can monitor the impact fouling has on performance," says Mr Dahl. "When you know that, you know the cost impact and the environmental impact. Then you can determine

what actions are necessary."

Actions in this case could include sending down divers to clean the hull or changing the ship's itinerary. "If an owner has a vessel where the anti fouling is not working well and it is not possible to drydock it, in the medium term they can redeploy it to an environment which causes less fouling. Owners can then allocate their best performing hulls to the most challenging environments," says Mr Dahl. "The FPM gives direct visibility to hull performance information and owners can immediately know when fouling starts to develop more aggressively. Previously they would have had to analyse fuel usage reports and they may have only been issued every six to 12 months."

Sea state and wind information garnered by the system can also be used to improve operational planning and save costs. "We use the same sensors that monitor the dynamic trim to measure the sea state," says Mr Dahl. "The wind information is fed into the system using the onboard anemometers. Our modelling software can then define what kind of impact these parameters will have on the vessel in terms of energy requirements."

Eniram's sensors are usually positioned evenly around a hull: one forward, one aft and one midships. "Hull bending needs to be taken into account, which can be up to 50cm, so the system needs several sensors," says Mr Dahl. A team of its engineers can perform the installation at sea, including cabling (though some owners prefer their crew to undertake cabling), and the sensors are monitored from the bridge and the engine room.

For the *Splendour of the Seas* installation, all data is sent back to the shoreside team. For all installations, the data is transmitted through the ship's satellite broadband to Eniram's Helsinki headquarters. The system transmits

an average of 50MB of data a day, which on high bandwidth cruise vessels is a small percentage of total usage. Transmissions are usually made during the night to minimise the impact on passengers' Internet services.

In March, Eniram will launch a new module called Optimum Speed Assistant. This uses the same modelling as the FPM tool and requires no additional hardware. "We are looking to help owners optimise speed and engine usage," says Mr Dahl. "Based on the weather, hull condition and trim data, ships will be able to know what speed, engine usage and engine combinations will be optimal.

"The system gives the crew guidance and visibility in the whole chain, starting from the fuel, to make the right decisions in all conditions. I would encourage all owners to provide us with fuel flow information as well, so we can further advise on engine optimisation and save them more money.

"With this speed and engine optimisation tool, our goal is to increase fuel savings from 2 per cent to 5 per cent. Based on the information we have on cruise ships, the potential for saving could be as much as 10 per cent on average."

Another optimisation system used by cruise ships is Optifloat, part of Onboard Napa software. Knud E Hansen USA is working with Napa and in January provided Princess Cruises' Grand class vessels with computational fluid dynamics analysis for trim measurement. The tool will be used within the Optifloat module and covers a wide range of trim, draught and speed conditions.

Optifloat recommends an optimal floating attitude for a ship, to improve voyage planning. It references the vessel's current trim using the Onboard Napa loading computer and compares speed and power datasets pre-loaded into the software.