Torre Diamante, Italy

Working with neutral host provider INWIT to deliver cellular coverage inside Italy's tallest steel building

Case Study

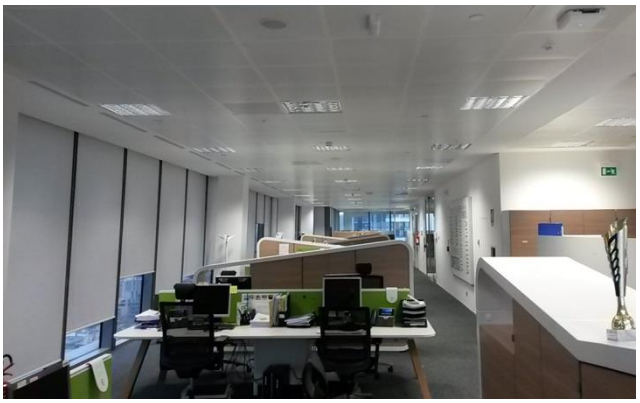
The most important thing we build is trust

Overview

Cobham Wireless deployed an intelligent digital Distributed Antenna System (idDAS) to provide cellular coverage throughout the 34-storey Torre Diamante, the tallest steel building in Italy. The capacity shifting solution provided a cost-effective and reliable means of overcoming a number of challenges the project presented.

Challenge

Although some areas within the Torre Diamante received coverage from existing macrocells outside, the glass and metal construction meant that the coverage was unreliable and inconsistent, and would not be adequate for the entire building. However, this also meant that any new cellular coverage system would have to be able to manage interference from the external signal, and ensure a high quality service for mobile subscribers.



The Challenge

In December 2016, construction work was completed on the Torre Diamante, Italy's tallest steel building, which stands at 140m and is located in Milan's new business district, Porta Nuova. Cellular coverage from local operators Vodafone and TIM (owned by Telecom Italia), was required throughout the entire building, in time for office workers – the building's main tenant is bank BNP Paribas – to take up residence.

Whilst some areas of the Torre Diamante did receive partial, patchy coverage from marcocells outside, the glass and metal construction meant that signals could not pass through to adequately cover all 30 storeys, plus the building's four underground floors. To mitigate these external signals, the new solution would have to allow for cellular capacity to be shifted dynamically throughout the building, to avoid interference.

Delivering coverage within Torre Diamante's stairways was also a challenge, as this area is constructed from concrete and steel on the inside, with a glass exterior. These stairwells serve as the building's main fire and emergency escape, so providing coverage here was essential, to allow people to communicate rapidly and reliably in the case of an emergency.

Without a BTS (base transceiver station) nearby, deploying a solution to provide cellular coverage would entail installing an antenna on the top of the Torre Diamante. However, Italy's stringent building regulations stated that this should not exceed 1.5m, otherwise planning permission would be required; a lengthy and costly process. Even installing the correct size antenna atop the building was not without potential problems, as radio interference from up to 30km away can affect the quality of the signal.

The Solution

Neutral host company INWIT selected Cobham Wireless to rapidly deploy an intelligent digital Distributed Antenna System (idDAS). It had to provide reliable cellular coverage from Vodafone and TIM to users throughout the entire 34-storey Torre Diamante building.

New office workers were moving into the new building gradually over a number of weeks, meaning different floors and sections were populated at different times. In addition, macro outdoor signal interference was affecting some areas of the building, and not others. As such, Cobham Wireless took an innovative approach to the project.

"Cobham Wireless installed 11 high powered remote units and 320 antennas in just three weeks. This was only possible because of the agile nature of the idDAS; with an analogue DAS it would have been extremely difficult to manage changes in configurations and deliver the project as quickly as we did."

Mike Voigt, Sales Director, Cobham Wireless

In the initial stages of the deployment there was no BTS available, so an off-air repeater and small antenna were installed on the top of the building instead, feeding the signal to the remote unit on the 27th floor. This infrastructure is extremely compact, so it was quick and easy to install and meant that the antenna did not exceed the maximum height prescribed by Italy's regulators.

Mike Voigt, Sales Director, Cobham Wireless explains: "With fewer people in the building to start with, the office tenants could make do with the off-air solution until the base station was installed. Despite being temporary it still worked very well. However, with 2,000 to 3,000 office workers gradually moving into the building, it quickly became essential to install a base station, in order to deliver the data capacity required by the tenants."

At the beginning of 2017 the configuration was finalised despite the tight timeframe; the off-air repeater and antenna were removed from the top of the building, and the BTS now provides the signal for the coverage solution. To cater for the different capacity needs required in different areas of the Torre Diamante, the building was subdivided into three sectors, each with dedicated capacity.

The solution encompasses three A-POI (active point of interface) and three MTDI (multi-technology digital interface) – one for each coverage sector – connecting to the BTS. The MTDI then connects to an MSDH (multi-sector digital hub) to supply the signal to one RU (remote unit) every three floors, linked to 12 MIMO (multiple input, multiple output) antennas per floor. A total of 11 high power idRUs (intelligent digital remote unit) were installed to support LTE frequency bands 1800MHz, 2100MHz, 2600MHz, as well as 900MHz which is not currently in use, but available if required in the future.

The Benefit

The idDAS system enables capacity from both Vodafone and TIM, to be dynamically shifted by floor and by operator, for each remote unit. This energy-efficient approach reduces the CAPEX and OPEX of running a network for multiple operators, and removes the costly problem of chunks of capacity remaining unused for large portions of time.

"Capacity shifting means we can utilise capacity efficiently," said Eugenio Chiappetta, Business Management & Operations, INWIT. "For example, if the cellular signal from outside the building is so strong that it interferes with that on a particular floor, the power from the idRU in that particular band can be reduced, or if stronger signal is needed in one area of the building, capacity can be shifted there. This means the operators' subscribers receive reliable coverage at all times, and they can continue to offer a great service."

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Thanks to the flexibility of the idDAS system, the configuration could be altered quickly and easily as the project evolved and more coverage was required. As the system is software-based, there was no complex cabling to deal with, and sectors could be reconfigured as required. This will allow a third operator to join Vodafone and TIM, and begin to deliver coverage far faster than if an analogue DAS was used. INWIT, as well as operators Vodafone and TIM, are able to monitor the performance of the system via the AEM (Active Element Manager).

"Cobham Wireless installed 11 high powered remote units and 320 antennas in just three weeks," added Mike Voigt, Sales Director, Cobham Wireless. "This was only possible because of the agile nature of the idDAS; with an analogue DAS it would have been extremely difficult to manage changes in configurations and deliver the project as quickly as we did."

In addition to reliable coverage in Torre Diamante's office spaces, the idDAS also delivers effective coverage in the building's stairwells; its main emergency escapes. The idRU feeds the signal to small antennas fitted just outside the fire doors; close enough to the stairwells to allow signal to penetrate, whilst compact enough in size to not affect the aesthetic look of the building's interior.

Office workers and visitors to Italy's tallest glass and metal skyscraper can now enjoy high quality cellular coverage throughout the entire building, whilst operators can benefit from the cost savings idDAS will deliver.

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