



WIRED BROADCAST • CLIENT STORIES SERIES

## One for the record books: TBI media delivers world's first live launch of a radio station from a high-speed train for Virgin Radio UK

TBI Media is an award-winning producer of programmes and live events for TV, radio, and online brands in the UK and abroad. Working with clients like the BBC, Disney, and BT Sport, TBI develops innovative concepts and produces complex creative projects.

For one of its most daring outside broadcasts, TBI Media turns to Wired Broadcast for expert implementation of a reliable broadcast solution at 125 mph.



### Challenge

Phil Critchlow, CEO and founding director at TBI, developed an unusual concept for the re-launch of Virgin Radio UK. Before pitching the idea to Virgin, he called Wired Broadcast to determine technical feasibility and cost.

Specifically, Critchlow wanted to know if it were possible to broadcast a live radio show from a train, at speeds of up to 125 mph, on a four-hour journey from Manchester to London. The programme would include two presenters and five music acts on board the train and require a reliable two-way, low-latency link to the Virgin studio.

Wired Broadcast is always the first outside broadcast provider Critchlow calls because of his long working relationship with its CEO, Johnnie Dymock. "It's a trust factor. There are very few people in the UK, or anywhere, for that matter, with the kind of expertise that Johnnie and his team have," Critchlow said. Back in 2007, Dave Brubeck had won a Lifetime Achievement Award at the BBC Jazz Awards and couldn't be present at the ceremony in London to accept it. TBI produced the event, and Wired Broadcast supervised a live satellite link-up with Brubeck in

New York and consulted on a method that enabled Brubeck to perform in perfect synchrony with the BBC Jazz Orchestra in London's Mermaid Theatre despite the long satellite delay.

For the Virgin Radio project, Critchlow knew the challenge would be getting audio from the train to the studio. He would need a reliable connection in the most challenging of circumstances. Knowing that Wired Broadcast had used multi-WAN technology to deliver high-quality connectivity for some of TBI's previous broadcasts by using just consumer cellular networks, Critchlow thought the same approach could work here. Securing budget and approval from Virgin would depend on producing evidence that the project could succeed technically. Moreover, success would depend on more than just technology. It would depend on Wired Broadcast's agility, dependability, and wide skill set to use the most cutting-edge technology effectively.



# Solution

**Measuring cellular coverage from a high-speed train** To determine technical feasibility, Wired Broadcast needed to test the solution thoroughly and assess connectivity along the proposed route. Because of train tunnels, including some that are several miles long, the train would hit dead zones at times, making live two-way transmission impossible with any technology.

To address this problem, Wired Broadcast developed a heat map showing segments of the route in which two-way transmission would be reliable, uncertain, or impossible, either because of a dead zone or because of too short a distance between dead zones. Because the proposed route for the launch wasn't a scheduled one, the team would rely on the train's location, rather than time, as the reference, while managing the complexity created by uncertainty about the precise times the train would reach key landmarks.

With a list of requirements to hand, Wired Broadcast contacted Virgin Trains to request a train for testing. As Dymock recalls, he told them, "We'll have to disable your onboard Wi-Fi and connect our own equipment to the train's antennas. This will cause disruption to your passengers, so ideally, we'd like to borrow a train." To his amazement, a few days later, Virgin said, "It looks like we can give you a train." In fact, Virgin provided Wired Broadcast with a private 11-coach intercity train for its test, running the proposed route between Manchester and London.

A key objective was to measure the number of cellular channels carrying data at any given location on the route. With two team members on the train and another at its London

studio, Wired Broadcast monitored connectivity over the entire journey using multi-WAN devices and monitoring software. By recording real-time graphs showing latency, packet loss, and GPS location using screen recording software, the team was able to slowly replay the video the next day to pinpoint where cellular coverage was good, mediocre, and poor. This information would allow Wired Broadcast to create their coverage map, provision appropriately, and create sufficient redundancy of cellular connections.

**Planning the radio programme around the train route** Wired Broadcast provided Critchlow with a detailed list of optimal times for each type of programme segment, enabling him to plan the show. For example, the show would include live two-ways when connectivity was strong for extended portions of the journey, with content from the studio planned at times when the train was expected to enter dead zones. Even with this information, total certainty would be impossible. Being chartered, the launch train would be required to slow down to allow scheduled trains to pass, possibly upsetting the order of the programme. To Virgin and TBI, this level of uncertainty was acceptable and even heightened the appeal of attempting an industry first.

**Using diversity to reduce risk of latency and dropouts** Wired Broadcast designed a connectivity solution characterised by three types of diversity—spatial diversity, mobile technology diversity, and carrier diversity. For spatial diversity, two multi-WAN routers were connected to two sets of antennas clustered towards the front and rear of the train. For mobile technology diversity, the solution employed a combination of 3G and 4G connections. Finally, for carrier diversity, the configuration used SIMs from all four UK cellular network operators. In total, the solution comprised 12 simultaneous mobile broadband connections. Surprisingly, the fixed broadband connection at Virgin's London studio was unreliable, so Wired Broadcast placed one of its Mediaport® multi-WAN routers there as well.

# Results

In the early hours of March 30, 2016, the day of the launch, a broadcast engineer and a network engineer from Wired Broadcast were on site at Manchester Piccadilly station to set up. The pair had a tight window in which to load the train, dismantle existing equipment, and install the solution. They would supervise the broadcast while TBI operated a full radio studio in one of the carriages, complete with mixing desk, microphones, cameras, and other equipment.

As scheduled, the chartered train full of presenters, musicians, press, and nearly 100 guests, left Manchester and began its four-hour journey to London via Crewe, Birmingham, and Rugby. For the first significant part of the journey, not a single packet of data was lost. "That's a tall order for an outside broadcast, even from a fixed site. Considering the circumstances, it was an extremely high-quality stereo connection at 192 kilobits per second," recalls Dymock.

The launch programme included two presenters on the train—Edith Bowman, presenter of Virgin Radio UK's Breakfast Show, and Matt Richardson, comedian and

drive-time presenter for the station. The programme featured five music acts performing live from the train: The Feeling, Travis, The Mystery Jets, Walking on Cars, and Irish singer-songwriter Gavin James. Sam Branson joined the programme on the train, and his father Richard called in live by phone from Necker Island. As the train approached its destination, all the musicians joined in performing Madonna's "Like a Virgin".

At Dymock's suggestion, the listening audience had been told at the outset that, when presenting live from a train reaching speeds of 125 mph, anything can happen. This approach was a clever way to build edge-of-your-seat excitement while hedging bets. In fact, the broadcast was completed with only one hiccup when the presenters introduced live music as the train entered a long tunnel. At that point, the studio picked up immediately and filled the slot with content, making the error barely detectable.

For Virgin, the live launch was a major coup. Sam Branson praised the team on the Virgin website, saying, "Well done to everyone involved in what can only be described as a truly fun,

out-of-the-box and unique radio launch!" For TBI and Critchlow, it was a major success. "The involvement of Johnnie and the Wired Broadcast team was an important aspect of our achievement. The fact that TBI delivered such an ambitious and successful project means Virgin will always consider us in the future."

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**About Wired Broadcast** Wired Broadcast is an international provider of agile connectivity for mission-critical applications and a trusted provider of end-to-end broadcast and live event facilities and services. Since 1992, we have served hundreds of influential clients in broadcasting (BBC), construction (RG Group), banking (Royal Bank of Scotland), live events (Live Nation Entertainment), defence, and more.

We manufacture Mediaport® multi-WAN solutions and distribute related products. Our wide range of multi-WAN solutions provides reliable connectivity for mission-critical applications in fields as diverse as security, law enforcement, the military, construction, education, live streaming, and of course, TV and radio.

**To learn more** about our multi-WAN solutions for remote broadcasts and live events, contact us at [sales@wiredbroadcast.com](mailto:sales@wiredbroadcast.com) or give us a call at +44 20 3376 7710.