COMMSCOPE®


# Node AM

## On-board coverage solution

Keeping your customers connected
The universal, multiband, multiservice, digital repeater for in-train coverage

# Node AM digital repeater for in-train

## In-train coverage challenges

Train applications present extremely challenging RF environments. The complexities of different terrain combined with the rapidly changing outdoor signal levels of the various networks makes it difficult for operators to provide the coverage and service their customers demand while travelling from city to city or to another country.

To improve availability and quality of wireless signals on trains, distributed antenna systems (DAS) have proven to be a more cost-effective method over installing expensive base stations.

***Business travelers expect good coverage, without dropped calls, and data connections wherever they are, for constant access to the internet, e-mail, and various mobile device applications.***

## The future-proof DAS solution

The Node AM's modular, scalable architecture allows the user to quickly modify, upgrade, or expand the repeater platform by simply adding RF cards and software features without increasing installation space. All available digital filter resources can be split between the RF cards as needed.

The platform is available in medium and high power classes, making it ideal for driving radiating cable and passive distributed antenna systems with the lowest possible power consumption.

Whether your requirements call for GSM-R, GSM, CDMA, UMTS, LTE, or a combination of all, the Node AM is capable of meeting the needs of all operators in challenging multiband, multiple-operator applications.

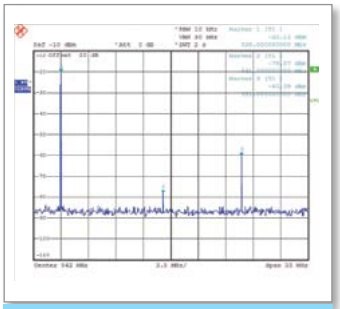
**High speed of travel** can complicate the "hand off" of signals, especially in sparsely populated areas that lack network facilities.

**Metallized windows** dramatically reduce signal penetration into the carriages, and result in spotty coverage and dropped calls.

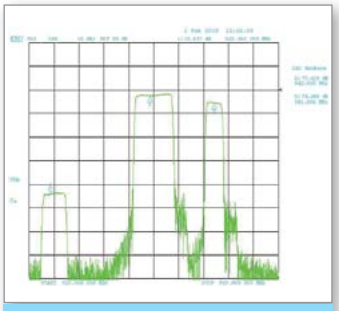
# Wireless coverage applications

## Node AM digital repeater features and benefits

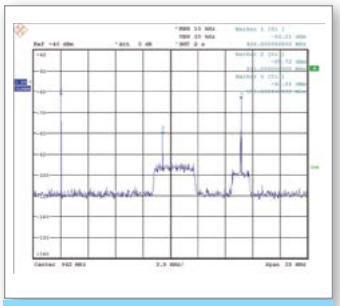
- Supports up to four frequency bands in a single chassis with a fully integrated multiband combiner and modem for remote monitoring and control.
- Web-server-based GUI enables on-the-fly filter changes and development of new features and capabilities without expensive hardware upgrades.
- Band-selective automatic gain/power trailing optimized for mobile multi-operator applications.
- Flexibility on changing the repeater configuration while travelling internationally based on received GPS position or MCC (patent pending).
- Intuitive auto setup wizard and help screens enable easy system configuration and minimize setup time and reliance on expensive, bulky test equipment.
- Advanced QoS measurements and reports, including inbound and outbound measurement of channel power/pilot power/RSSI, facilitate setup and verify ongoing system operation.
- Remote alarming including GPS positioning through integrated 3G modem.
- Seamless integration with A.I.M.O.S., CommScope integrated management and operating system.



Donor antenna input signal



Node AM gain trailing



Input signal mobile phone

# Departing a major metro-area train station

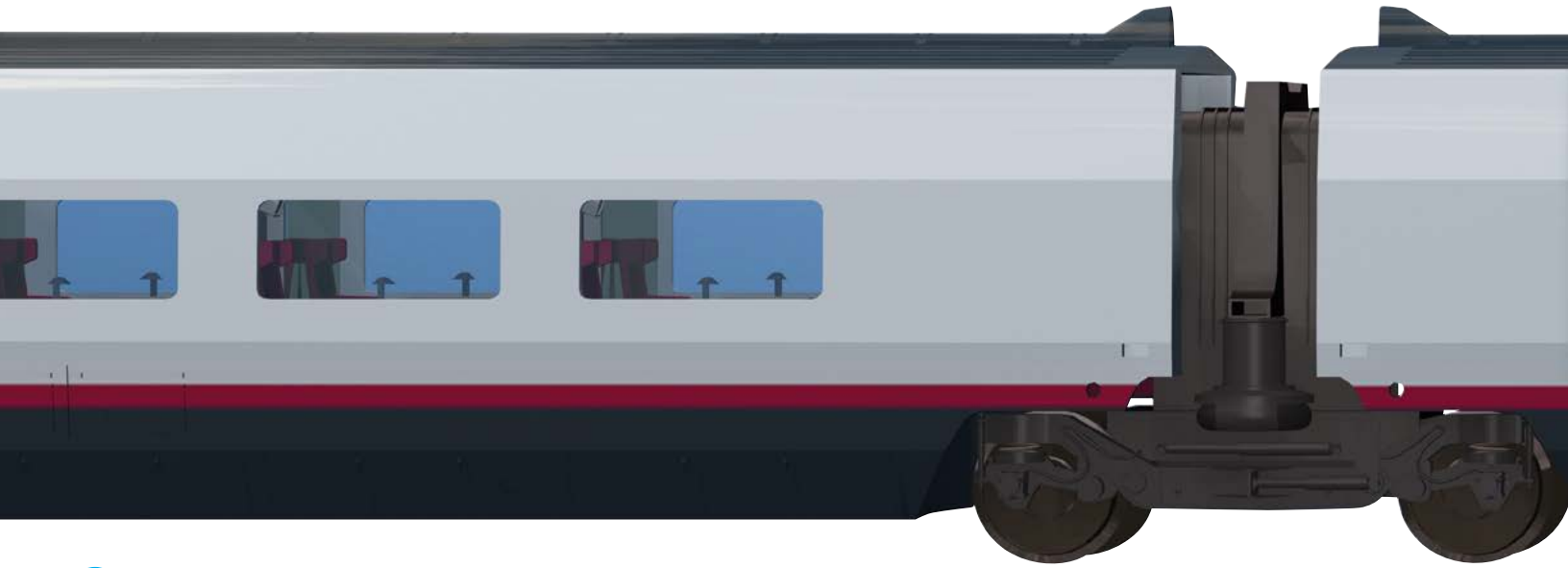
## Maximum coverage without interfering with nearby base stations

When departing from a train station, nearby base stations are casting strong RF signals within the station platform and surrounding areas.

Its gain trailing feature allows the repeater to adapt to the environment accordingly and will continuously change its gain and noise level, preventing interference with nearby base stations. It will then increase gain once in the countryside or rural areas where network facilities are limited.

- Gain trailing in uplink and downlink are synchronized
- 40 dB gain trailing range ensures that base station receivers aren't desensitized by Node AM's uplink noise transmitted back to the base station


**Compact, modular, and rack mountable in a 19" frame,** the Node AM delivers superior coverage while coping with the external RF environment.



# Passing a green field area

## Automatic and fast gain trailing along the tracks in green field application

The high dynamic range allows operation in the presence of strong transmitters without the need for external filtering or attenuation. Its advanced filtering capabilities allow only the desired signals to be transmitted, resulting in optimum utilization of the repeater's output power capacity.

Since the undesired signals are not amplified, potential interference issues are mitigated.

- 40 dB gain trailing per operator enables stable coverage area
- Nearby base stations will be attenuated while base stations far away will be amplified with maximum gain, resulting in an overall dynamic range of 70 dB

**CommScope's radiating feeder cable is the preferred solution for homogeneous coverage inside the train coach**
The signal is then transmitted to the leaky feeder or radiating cable inside the roof of the train carriage, which then distributes the signal throughout the coach of the train.

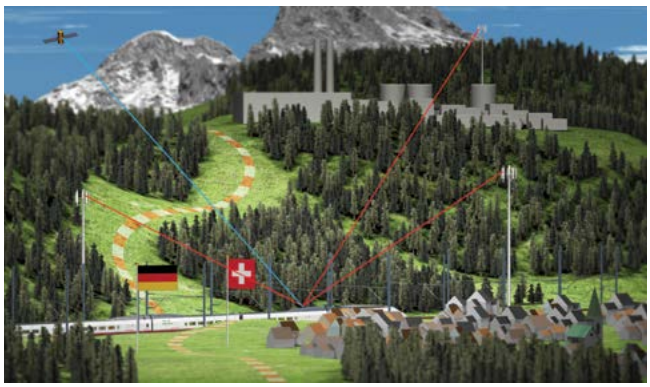
# Entering a new country

## Automatic detection of GPS location and frequency allocation

When crossing from one country to another, an embedded GPS receiver in the repeater allows automated frequency allocation based on GPS position. This innovative feature adds flexibility by changing frequency configurations.

The possibility to add all worldwide sub-band configurations leads to a standard solution for all train manufacturers and wireless operators.

- Repeater frequency setting configurations will automatically be changed based on detection of GPS position

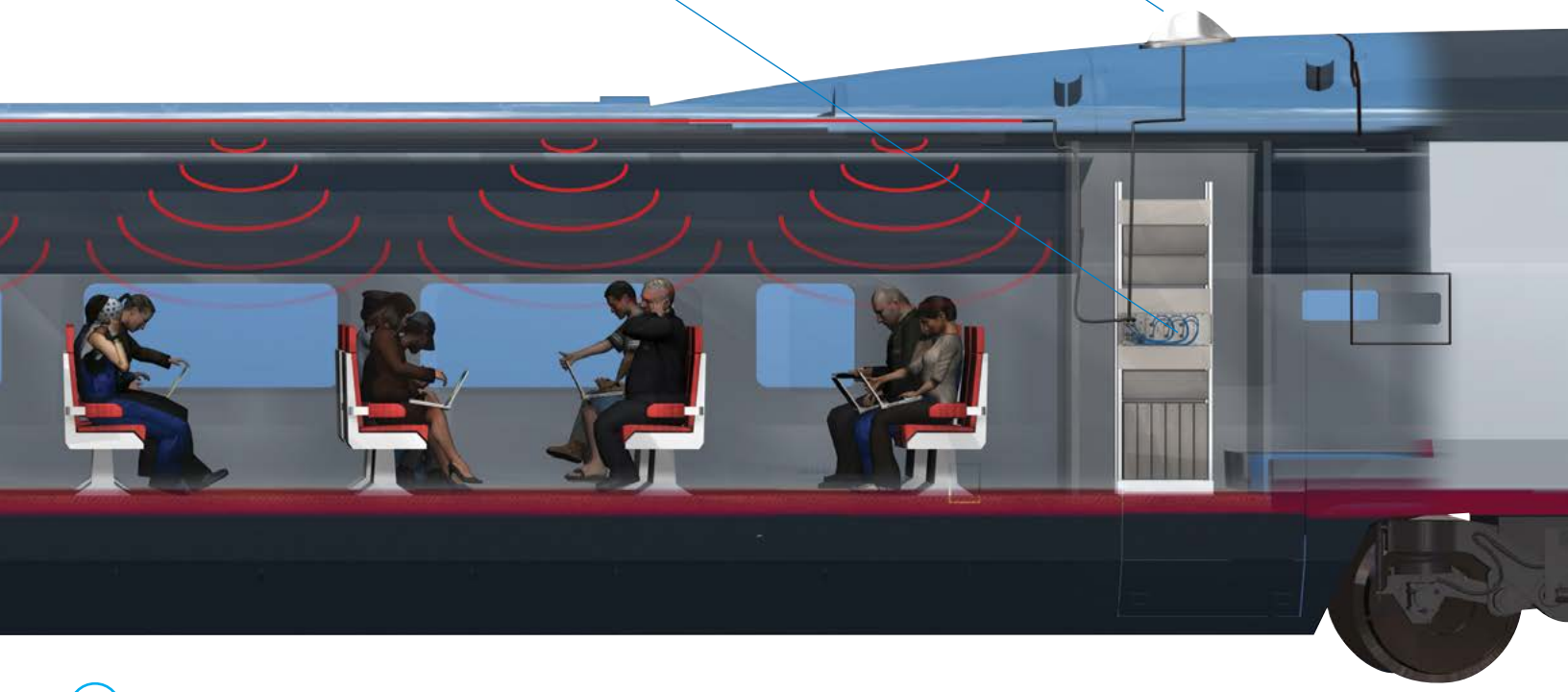


**At the heart of the DAS system is the Node AM digital repeater.**

In the downlink path, the BTS signal will be filtered and amplified in the repeater and transmitted into the coach via the radiating cable. In the uplink path, the signal from inside will be picked up through the radiating cable, filtered and amplified by the repeater, and transmitted back to the base station via the rooftop antenna.

**An omni pick-up antenna with an integrated GPS path is used as a donor antenna on top of the train car.**

It picks up the signals from nearby base stations and feeds them to the Node AM digital repeater, which filters, processes, and re-amplifies the signals into the train car.



# Arriving at final destination

## Maintains strong coverage while not desensitizing base stations

Once a high-speed train reaches its destination, the base stations located inside or nearby the train station are casting strong RF signals within the station platform and surrounding areas.

The gain trailing feature allows the Node AM digital repeater to again adapt to its environment. It will continuously change its gain and noise level so it does not cause interference with nearby base stations.

Since the undesired signals are not amplified, potential interference issues are mitigated.

- Gain trailing in uplink and downlink are synchronized
- 40 dB gain trailing range ensures that base station receivers are not desensitized by Node AM's uplink noise transmitted back to the base station

**Build and expand your system with various RF card modules**

## A legacy of success with high-speed train and rail projects

For more than a decade now, all across Europe and Asia, including Finland, Germany, Italy, Norway, Portugal, Spain, Switzerland, United Kingdom, Russia and China, wireless operators have turned to CommScope Solutions for our expertise and comprehensive portfolio of products for improving coverage for their in-train, metro, and rail projects.

As the world's leading manufacturer of repeater systems for mobile communication networks, CommScope has extensive experience and expertise in radio planning, project management, and system engineering.

Everyone communicates. It's the essence of the human experience. *How* we communicate is evolving. Technology is reshaping the way we live, learn and thrive. The epicenter of this transformation is the network—our passion. Our experts are rethinking the purpose, role and usage of networks to help our customers increase bandwidth, expand capacity, enhance efficiency, speed deployment and simplify migration. From remote cell sites to massive sports arenas, from busy airports to state-of-the-art data centers—we provide the essential expertise and vital infrastructure your business needs to succeed. The world's most advanced networks rely on CommScope connectivity.

COMMSCOPE®

commscope.com

Visit our website or contact your local CommScope representative for more information.



BR-103450.12-EN (12/16)