



# H-SERIES DMR REPEATERS

**EMPOWERED** COMMUNICATIONS



## Hytera DMR Tier II Conventional Repeater Systems

DMR Tier II Conventional Repeater Systems are professional two-way radio systems that use repeaters for improved range and capacity for voice and data communications.

Tier II systems are for medium and large size organizations that require wide-area coverage throughout a school campus, business complex, or open rural area. Standards compliant DMR Tier II radios are available from several manufacturers, allowing for easy integration with existing analog radio systems.

Digital Mobile Radio (DMR) is the open radio industry standard developed by the European Telecommunications Standards Institute (ETSI) and promoted worldwide by the DMR Association. Hytera was instrumental in the development of the DMR standard, and the initial launch of fully compliant DMR two-way radios.

DMR uses two-slot TDMA (Time Division Multiple Access) technology to divide a single 12.5kHz channel into two time slots, allowing two separate conversations to take place at the same time. DMR with TDMA and 12.5kHz channel spacing offers numerous advantages over analog radio systems, including improved voice quality, longer battery life, interoperability with existing analog systems, and dual-slot operation doubles the calling capacity of a single frequency.

DMR standards compliance ensures that all radios and base stations operate to a common standard and enables the creation of a robust and reliable communication system that is more effective than a system based on proprietary technologies.



# THE KEY BENEFITS OF DMR REPEATER SYSTEMS



## Enhanced Coverage and Range

DMR Tier II conventional repeater systems significantly enhance coverage and range compared to direct radio-to-radio communication. By strategically placing repeaters at elevated locations, these systems can extend the signal coverage area, overcoming obstacles such as buildings and terrain. This ensures that users can communicate seamlessly over a broader geographic area, improving overall operational efficiency.

## Improved Signal Quality

One of the primary benefits of DMR Tier II conventional repeater systems is the improvement in signal quality. The repeaters receive weak signals from handheld or mobile radios and retransmit them at a higher power level, resulting in clearer and more reliable communication. This ensures that messages are transmitted with minimal distortion or interference, leading to enhanced clarity and intelligibility.

## Increased Group Calling Capacity

Conventional repeater systems allow for simultaneous communication between multiple users to increase call capacity. With DMR Tier II, users can access the repeater and communicate with one another concurrently, promoting efficient group communication.

## Scalability and Flexibility

DMR Tier II conventional repeater systems offer excellent scalability and flexibility. As the system's capacity is determined by the number of available channels, it can be easily expanded by adding more repeaters or increasing the number of available channels. This scalability enables organizations to adapt their communication infrastructure to growing needs without the need for a complete overhaul.

## Advanced Features and Functionality

Repeater systems offer additional features and functionality that can enhance operational efficiency. These include features like emergency signaling, remote monitoring, network connectivity, and dispatcher consoles.

## Enhanced Privacy and Security

Privacy and security are paramount in professional communication systems, and DMR Tier II conventional repeaters offer robust features in this regard. Encryption capabilities are built into DMR Tier II, ensuring that sensitive information remains protected and confidential. Additionally, repeaters can be configured with advanced access control features to limit unauthorized usage, providing an additional layer of security.

## Interoperability

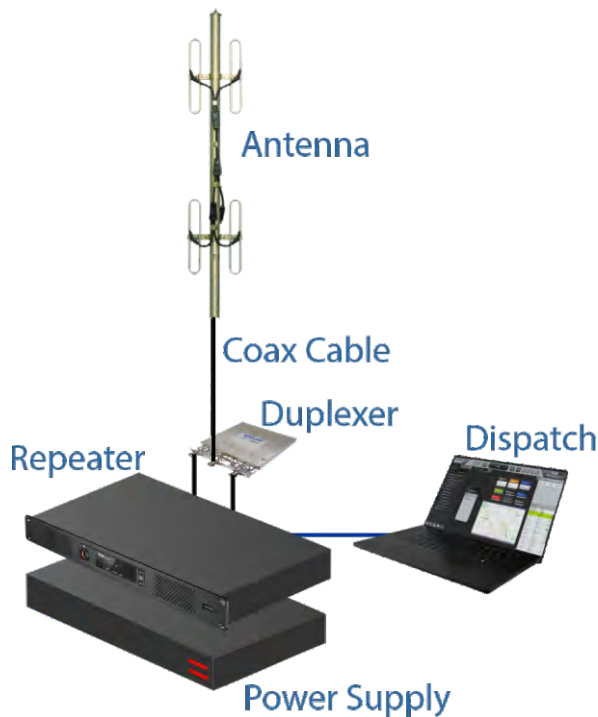
This is a crucial advantage of DMR Tier II conventional repeater systems. DMR is an open digital radio standard, ensuring compatibility among different manufacturers' equipment. This allows organizations to choose from a wide range of DMR-compatible radios and infrastructure components, promoting interoperability and eliminating vendor lock-in.

## Enhanced Management and Monitoring

DMR Tier II conventional repeater systems offer advanced management and monitoring capabilities. System administrators can remotely monitor and manage the repeaters, perform diagnostics, and optimize system performance. These features enable proactive maintenance, efficient troubleshooting, and swift resolution of any issues, leading to increased uptime and operational reliability.



# HOW IT WORKS - THE COMPONENTS OF A TIER II REPEATER SITE



A DMR Tier II Repeater Site consists of a DMR repeater, antenna systems, and supporting equipment which typically includes power supplies, backup batteries, and monitoring systems. The repeater and associated equipment in a Conventional Tier II system is also referred to as a Base Station.

DMR Tier II repeater systems are installed by authorized Hytera US Inc radio system dealers who are professional radio system integrators that can configure and install all the necessary radio system components.

**DMR Tier II Repeaters** – The Hytera DMR repeater is the heart of a professional DMR radio system. It is responsible for receiving and transmitting radio signals over a wide area. Repeaters receive low-level signals from handheld and mobile DMR radios and retransmit the information at a higher power level over a greater area with antennas installed in an elevated site like the top of a building. This is commonly referred to as the range of the repeater, the area within which you can activate the repeater with the transmitted signal. Two or more repeaters can be deployed together and assigned to different call groups.

The repeater typically consists of a receiver, transmitter, and a duplexer. The receiver receives incoming radio signals and filters them to ensure that only the desired signals are transmitted to the transmitter. The transmitter then amplifies and retransmits the signal over a wider area. The duplexer is used to separate the incoming and outgoing signals, allowing the repeater to operate on two frequencies (Tx and Rx) on one antenna.

Multiple repeaters can be deployed in Tier II systems for additional channel capacity.

**Antenna Systems** – Antenna systems are used to transmit and receive radio signals between the base station and mobile and portable radios. A DMR base station can consist of several antennas, including a main antenna and auxiliary antennas. The main antenna is used to transmit and receive radio signals over a wide area, while the auxiliary antennas are used to provide coverage in specific areas, such as buildings or tunnels. Some DMR Tier II systems use more than one frequency and have a separate antenna for each frequency. Antenna patterns can be adjusted so that a repeater range can cover a certain area or direction only, but the majority of antennas are omnidirectional.

**Supporting Equipment** – Additional equipment is used to provide power and network connectivity for the repeater site. This equipment typically includes power supplies, backup batteries for mission critical operations during natural disasters. The power supplies provide the necessary power to operate the base station, while backup batteries are used to provide backup power in case of a power outage. Repeater sites may also include optional network infrastructure such as servers, routers, switches, and other networking equipment required to connect the different components of the DMR Tier II radio system.

**Dispatching Application** – The Hytera SmartOne dispatch application (also called a dispatch console) is a client software application that provides centralized control and monitoring of the DMR Tier II radio system, including voice calls, GPS location tracking, messaging functions, and voice recording. It enables the dispatcher to communicate with multiple radio terminals simultaneously and monitor the activity on the system. A dispatcher will communicate with the radios on the system using a microphone and speaker connected to the PC running the dispatch application.



## WHEN TO DEPLOY A DMR TIER II SYSTEM

For smaller groups of radio users, basic radio-to-radio communications are deployed. This is simply a group of radios talking to each other. This can typically start out with analog radios because of the low cost and ease of use. As the groups of users get larger, they can upgrade to DMR radios to leverage the benefits of DMR standard-based technology.

The limitations of DMR or analog radio-to-radio deployments are call capacity and coverage area. Coverage area is limited to the transmit power and the transmit and receive technology built into the radios. The transmit power of a typical DMR radio is typically 4 to 5 Watts and can achieve a moderate transmission range of a few miles on open land with a clear line of site. Radio transmission range is dramatically limited and by obstacles like hills and buildings, and this can vary based on the unique landscape of the deployment. Call capacity is limited to the two-slot talk channel of the DMR standard.

DMR Tier II Conventional Repeater systems are deployed to when the limited range, growing number of users, and high quantity of calls on radio-to-radio systems are limiting the organization's communications capacity.



HR652 Compact Repeater

## INDUSTRY LEADING DMR REPEATERS

Hytera repeaters are available as professional network equipment that can be installed in a standard 19" rack typically found in a data closet, and as compact repeaters that have integrated antennas for applications for use in tight spaces. Compact repeaters can also support portable applications with integrated battery packs for carrying the repeater in mobile applications.



HR1062 Rack-Mount Repeater



### Hytera US Inc

8 Whatney, Suite 200, Irvine, CA 92618

1363 Shotgun Road, Sunrise, FL 33326

(954) 846-1011

[www.hytera.us](http://www.hytera.us)

[info@hytera.us](mailto:info@hytera.us)



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Hytera\_DMR-Tier-II\_DS-B 8/25