

# **ENHANCING MOBILITY FOR MISSION AND BUSINESS CRITICAL MOBILE RADIO USERS**

## EXECUTIVE SUMMARY

Mission and Business Critical users of mobile two-way radio systems demand Push-to-Talk communication capabilities that are always available and reliable, irrespective of environmental circumstances. To date communication between operators in the field and control room operations have depended upon the use of high power base station networks combined with vehicle based mobile radios to provide these essential capabilities over long operating ranges. Consequently this network design remains the communication backbone of users under critical, emergency and high pressure circumstances.

Despite the stakes involved with mission critical environments, users of these communication systems are exposed to significant operational gaps and a network design drawback: reliance upon the vehicle radio to remain in constant communication. Out of vehicle portables will usually not suffice due to limited range and power constraints combined with increased provisioning costs. Alternatively, users when out of the vehicle are exposed to the health and safety risks involved with being out of communication range.

Responding to these challenges, Wireless Pacific set out to develop a cost effective solution that would allow unprecedented levels of user freedom, mobility and safety, within land mobile networks without compromising the reliability, security and coverage required in mission critical applications. After considerable research, investment and development, Wireless Pacific created the patented X10DR® Secure Wireless Microphone.

The compact, lightweight X10DR personal wireless speaker microphone extends the power of the mobile to the palm of a mobile user both in and out of the vehicle. X10DR stands ready to redefine mobile network design that increases both user functionality and mobility whilst reducing infrastructure investment. This revolutionary product provides, for the first time ever, true seamless out of vehicle communications with the power and performance of the mobile radio at an implementation cost allowing adoption by every mobile user. The X10DR cuts the cord and puts the microphone and radio system access into the users hand away from the vehicle, delivering true mobility without, system compromise.

## ENHANCING USER MOBILITY IN CRITICAL NETWORKS

Deploying land mobile radio networks for mission critical and business essential users takes a significant engineering effort; balancing operational performance, system access and maximum usable coverage is a constant design challenge. As operational geographical areas become greater the need to maintain performance and coverage reliability becomes increasingly difficult, complex and expensive. Developing solutions for these competing requirements, land mobile network engineers typically design network coverage for vehicle installed mobile radios. For hand held portable performance and coverage this is usually approached as a secondary or as a not guaranteed consideration. However, this performance compromise affects vital field operational effectiveness and most seriously, users personal safety. Poor portable radio coverage in mobile design systems restricts users from leaving the vehicle and potentially being unable to call a team member or control room. Emergency calls may not get through rendering the user potentially out of range and out of control room visibility.

For many years system designers and radio manufacturers have grappled with solutions to enhance user mobility through increased portable radio coverage particularly when away from the vehicle. These solutions typically involved significant additions of base station infrastructure; radio sites and complex remote receiver voting systems to back fill marginal coverage areas.

Alternatively, manufacturers developed cumbersome vehicle based repeater systems where local simplex portable transmissions are repeated through a vehicle fitted cross-band repeater back into the base station network. These systems require additional engineering considerations, additional frequencies and the design of complex contention management protocols to eliminate radio communications clashing from multiple vehicle repeaters at the scene.

Vehicle Repeaters usually add system delays and require user intervention for which channels, mode or status of the vehicle repeater. Besides the lack of system design elegance and unnecessary complication for the user, the huge implementation costs restrict these solutions being added to every mobile user. These 'smart' vehicle repeaters with matching portable radios typically incur costs 4 to 5 times

*“ A revolutionary yet cost effective solution to an age-old problem ”*



the investment of a single mobile radio. For users of trunked mobile radios, digital radio systems and users requiring encryption, these historic approaches to provide out of vehicle communications have seen investment costs significantly balloon or have become so technically complex that they have become unfeasible.

Meeting the challenge of delivering enhanced mobility for radio users, Wireless Pacific developed the X10DR Secure Wireless Microphone. The X10DR enables users, for the first time, complete and total freedom to leave the vehicle and stay constantly connected by the vehicle radio to team members and dispatch control rooms. The X10DR Secure Wireless Microphone maintains a reliable, encrypted link to the mobile radio for up to 300 metres/yards or more from the fixed vehicle radio. The X10DR performs like a remote speaker microphone invisibly connected to the mobile providing full Push To Talk transmit, receive and emergency call functionality. The user experiences easy operation and total control of the full powered mobile radio. The X10DR is a revolutionary yet cost effective solution to an age-old problem.

## X10DR® - A MOBILE IN YOUR HAND

Mobile radios are designed with a single uncompromising focus for reliability under the most adverse of conditions with careful and exact consideration placed on power supply and antenna. The mobile radio antenna represents the single most important element of a vehicle system where optimum performance can be compromised by poor choice of antenna design and mounting location. Every single dB gained by the mobile installation can dramatically improve overall system performance. The X10DR leverages these critical system considerations by design to provide users with full mobile performance in their pocket. Each X10DR is hard coded to each mobile securely ensuring instant and reliable access at all times. The X10DR has been designed with simplicity in mind, eliminating mode buttons and menus whilst retaining essential push to talk remote microphone functionality.

X10DR's are designed to attach comfortably to an epaulette or lapel ensuring all radio transmissions are received loud and clear whilst absent from the vehicle. For added privacy the X10DR enables discrete 3.5mm earpieces and headsets to be connected via an industry standard Hirose connection. The X10DR user remains securely tethered to the radio network while attending out of vehicle incidents. At any time the X10DR user can PTT and connect instantly to the network delivering vehicle unit ID's, GPS information and status details. X10DR harnesses the full capability and performance of the network and places it into the pocket of the radio user. X10DR has been designed to be fitted to any professional analog, digital or trunked mobile radio delivering user complete network connectivity when away from the vehicle. X10DR's can also be deployed in control room or dispatch scenarios allowing dispatchers or system managers to monitor or control system operations away from the fixed radio base. Rural and single operator locations can now leave the control room and stay tethered by a secure wireless X10DR microphone and attend other duties whilst staying in total control.

## SECURE AND RELIABLE

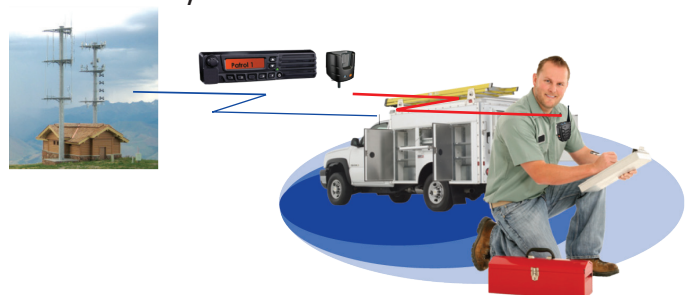
Wireless Pacific delivers high reliability audio and rapid deployment secure radio systems to public safety, industrial and commercial radio users. Each solution developed has been hallmarked by a sharp design focus that is driven to deliver a positive and operationally effective user experience. Solution confidence and acceptance by users can only be

achieved when the system core design is based on public safety communication network insights and real world environment reliability. These fundamental design criteria transcend across the X10DR hardware, software, communication protocols and RF integration. Each aspect must meet these requirements. The X10DR Wireless Mobile Microphone has been developed driven by these key principals from user experience and public safety market empathy.

The X10DR's design core is founded on the well proven Industrial Frequency Hopping Spread Spectrum 802.15 digital communications protocol. This industrial class of operation extends significantly the transmission range to achieve reliable coverage performance of up to 300 metres. The X10DR Secure Wireless Microphone incorporates a range optimised RF designs with perfectly matched antennas between the vehicle node and the remote microphone. Within the X10DR communications protocol high level 64/128 bit digital encryption is embedded within each message ensuring high levels of security for each radio voice transmission. Adding to the voice encryption further security measures have been added to eliminate any potential connection compromise.

## HLC™ Hard Line Coding

Each X10DR uniquely incorporates HLC™ a "Hard Line Coding" connection protocol that minimizes any risk or possibility of pairing intrusion and link compromise between the X10DR and vehicle mobile node during the initial pairing process. X10DR's Hard Line Coding design requires a direct physical connection between the wireless microphone and radio interface, similar in concept to the accepted encryption keyloading principal within secure radio environments. HLC procedure of device connection delivers users with confidence that communication transmissions always remain secure and reliable. The X10DR digital link encryption and HLC security connection protocol typically exceeds the voice security levels of most mobile radios, base stations and control infrastructure systems.







*The X10DR® liberates officers from being wired to the vehicle*

### Coverage Enhancements

X10DR performance has been targeted at the mainstream need for vehicle based personnel to rapidly move away from their vehicle while remaining connected. The variety of users can range from a heavy haulage delivery truck driver who may only leave the vehicle for rest/meal breaks and a couple of delivery stops, where they may never venture further than 100M from the vehicle, to that of a Law Enforcement, Fire or Ambulance officer who may need to go anywhere within a premise and render assistance. This diversity of coverage expectations requires a platform of system solutions to address the scope of complexity needed to achieve acceptable performance.

The X10DR Secure Wireless Microphone in its most basic form delivers solid sound communications for approximately 60-100 metres from the vehicle by using a simple ground independent antenna attached directly to the base of the vehicle X-Ponder charging unit. Alternatively, the range can be significantly enhanced to provide greater acceptable performance over longer distances, or for example into the lobby of buildings by use of roof-mounted antenna. A variety of antenna gains are available to suit the majority of applications from zero to up to 5dBi. In the most de-

manding of deployments, a 13dB in-line bidirectional amplifier (BDA) can be added (where type approved by regulatory authority) and located close to the antenna radiator to compensate for cable losses in order to a maximise even greater range and in-building penetration.

As with all radio communications solutions 100% coverage can never be guaranteed but by the careful selection of antenna height and gain the desired level of acceptable performance can be achieved. Naturally, acceptable performance will vary by user organisation and operational requirements but careful considered up front planning can ensure users are equipped with the most economical and technically viable communications solution that they need to perform their duties.



**Talk up to 300 metres /  
1000ft from the vehicle**



## MEETING USER EXPECTATIONS

Mission critical and business essential radio users demand reliability and performance without compromise. First responders totally depend on their radio systems to perform difficult duties and remain connected to their teams both in and out of their vehicles. Public Safety Land Mobile radio systems have evolved with a single focus for mission critical reliability that must work each and every time the PTT is engaged. Based on these fundamentals the X10DR has been designed to build on and complement these key system objectives. Users in these environments expect robust, reliable and high performance communications; the X10DR delivers as an easy to use mobile radio accessory that extends the mobile radio to the working environment. Simplicity and easy operation characterise the design fundamentals of the X10DR Secure Wireless Microphone.

## ADVANCED DESIGN CRAFTED BY EXPERIENCE

Typically as technology becomes more complex the user interface becomes less user friendly. Smart product designers attempt to re-invent simplicity when in fact for mission critical radio users simpler and easy is actually smarter. Under times of duress and scene stress nothing more than a simple tactile PTT button is required. There can be no compromise for the ultimate simplicity of Push To Talk. Palm sized with large easy to use PTT defines exactly what a wireless mobile microphone should be. Leaving a vehicle alone means staying wirelessly tethered to your team or control room with the last mode selection on the vehicle radio. Simple tones and visual indicators advise the user of their network status and connectivity at all times.

Weighing less than 150 grams the X10DR Secure Wireless Mobile Microphone can be comfortably worn on the shirt or jacket ensuring the control room or other team members calls are always within earshot even when out of site of the vehicle. Adding to the X10DR flexibility an industry respected Hirose audio port allows easy connection of covert accessories or headsets enabling field teams to customise the X10DR to meet the specific operational need. This includes connection to Motorcycle Helmets, console headsets and a variety of surveillance accessories. Finally, solo officers can cut the cord that tethers and remain control room connected on or off the bike at all times eliminating another OH&S plugs and wire hazard.

## ALL DAY OPERATION

Each X10DR incorporates a high capacity Lithium battery that can deliver over 12 hours of operational performance between each re-charge so those users whose duties require them to be continually out of the vehicle can wear the unit all through their work day. X10DR's are charged simply by parking the X10DR into the hang-up pocket in the vehicle so those users which may only leave their vehicle a few times a day are free to have it sitting in the pocket on-charge.

## X10DR's TEAM UP

While the X10DR system has been designed to address the single user goal of remaining connected to the network when away from the vehicle, the X10DR Secure Wireless Microphone can be teamed up when required and provide multiple user operation from a single mobile radio. X10DR's smart node interface passes both transmit and receive audio to each X10DR ensuring each X10DR user hears all users active parts of the communications sent over the host two way radio channel. For example, one user could remain around a vehicle while another user could be investigating an incident around a house or at a vehicle accident site or for Utilities, one person up in the bucket and the other on the ground. As long as both users remain within the vehicle network, they are fully connected for both transmit and receive conversations at all times.

## MULTIPLE X10DR VEHICLES AT THE SCENE

For organisations that typically may deploy more than one vehicle to any one incident, accident or work site, X10DR inherent design ensures that each Secure Wireless Microphone remains exclusively connected to their assigned vehicle. There is no need for any user intervention as vehicles arrive or leave the scene. This simplicity of operation ensures staff can focus on the tasks at hand and not mastering or re-learning how to operate the radio system.

## X10DR DURESS ALARM

X10DR's can provide a duress button that can be used to activate the emergency mode within the host mobile radio. When the duress mode is activated on the X10DR, the appropriately fitted host mobile radio, can signal the control room or other radio channel users by activating other mobile based emergency features such as Unit ID's, open Mics and GPS data location information.







*The manager can remain in contact with the fleet: wirelessly*

## NON-VEHICLE & ALTERNATIVE APPLICATIONS

### CONTROL ROOM

Single operator or rural control rooms can stay in constant contact whilst away from the RF Control or local base by wearing an X10DR Secure Wireless Microphone around the office or facility. Use of an ear-piece or the Hirose headset connection also allows communication discretion in a busy office scenario.

### WATERCRAFT & BOATS

Watercraft operators can also stay in constant contact whilst moving around the craft both up and below deck. X10DR Secure Wireless Microphone can interface to Land Mobile and Marine Radio equipment.

### IN BUILDING EXTENSION

Often network coverage can be marginal in remote areas and a simple RF control station on a rooftop may be able to communicate with the local repeater base station or network but coverage from within the building may be unusable. Incorporating X10DR technology effectively delivers a wireless remote control. This can help eliminate hard wiring from remote consoles to a control station located elsewhere in the building. A correctly configured X10DR allows the user total connectivity within the building allowing the factory manager to remain in direct contact with the trucking fleet: wirelessly.

### APPLIANCE DUAL RADIO ALTERNATIVE

Large Support appliances often fit a second radio or control head to the rear of the unit. This adds significant cost and logistics. A Two Up X10DR system will provide radio control front both ends of the appliance but also while the users move around the vehicle. X10DR universal audio interface is ready for helmets and BA systems. The vehicle radio remains the focal radio of the appliance team reducing confusion and “who is on which channel”. The host mobile radios can also be enhanced with dual control heads where channel/mode selection to other advanced feature access is required.

### COVERT OPERATION

The small size of the X10DR unit may allow for its selective use in covert applications. The remote monitor PTT function means someone else can enable “listening” without the covert operative having to touch anything. As audio is duplex (bi-directional) you can also talk to them at the same time. A highly secure 128 bit version is also available to ensure high levels of voice protection.



## OCCUPATIONAL HEALTH & SAFETY - EMPLOYEE DUTY OF CARE

While in general X10DR is intended for all types of mission critical and business essential operational deployments, it has a special focus on supporting lone workers and is also highly suitable for helping ensure employee "duty of care" in situations where staff may be required to work at remote or isolated locations and there exists, a risk of injury or attack while walking from their workplace to the personal vehicle or while waiting for other public transportation late at night, etc. X10DR provides a re-assuring constant voice link back to the office equipped radio so after hours staff can be alerted in the case of a mishap or worse.

### SUMMARY

The X10DR will revolutionise the future of mobile radio communications for mission critical and business essential users. The X10DR is a liberating, cost-effective, robust and reliable solution that enables wireless, encrypted communications to 300 metres or more from a vehicle or fixed mobile radio system. After years of research and design investment, Wireless Pacific are proud to release the X10DR to the market as an industry first and look forward to the X10DR playing a vital role in your communications success story. To learn more about how the X10DR will revolutionise your mobile radio system, please contact Wireless Pacific

