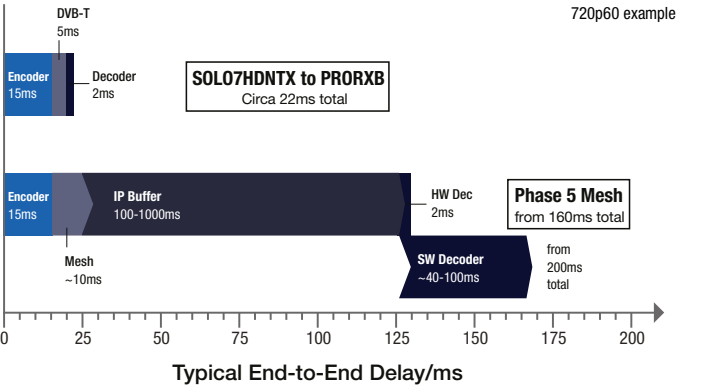# ROBOTICS COMMUNICATIONS

LOW LATENCY WHEN IT MATTERS

The diagram to the right shows the typical latencies in both our COFDM Point to Point and IP Mesh systems. These demonstrate why DTC are a market leader for UAV applications.

720p60 example

DVB-T 5ms
Encoder 15ms
Decoder 2ms
SOLO7HDNTX to PRORXB Circa 22ms total

Encoder 15ms
IP Buffer 100-1000ms
HW Dec 2ms
Phase 5 Mesh from 160ms total

Mesh ~10ms
SW Decoder ~40-100ms
from 200ms total

0 25 50 75 100 125 150 175 200

Typical End-to-End Delay/ms

COFDM POINT-TO-POINT

SOL8SDR-C   SOL7TX   SOL7RX

NANOVUE   MICROVUE

DATA RATE CAPABILITIES

The tables below show the data rate throughput capabilities of the DTC Phase 5 IP Mesh system operating in MiMo and Reduced MiMo modes. The ability to have auto adaptive modulation means that a stable link will be maintained for the maximum amount of time which improves range and reliability for the user.

SQT Value	SNR Threshold/dB	Reduced MiMo Rates to SOL8SDR for each frequency bandwidth/Mbps														
		1.25MHz	1.5MHz	1.75MHz	2.5MHz	3MHz	3.5MHz	5MHz	6MHz	7MHz	8MHz	10MHz	12MHz	14MHz	16MHz	20MHz
6	23.1	n/a	n/a	n/a	n/a	n/a	n/a	11.9*	14.3*	16.7*	19.1*	23.9*	27.5*	31.2*	34.8*	44.0*
5	17.1	2.1	2.6	3.0	4.3	5.1	6.0	8.5	10.2	11.9	13.6	17.0	19.6	22.2	24.8	30.0
4	14.1	1.6	2.0	2.3	3.3	3.9	4.6	6.5	7.8	9.2	10.5	13.1	15.0	17.0	19.0	23.8
3	11.1	1.1	1.3	1.5	2.1	2.6	3.0	4.3	5.1	6.0	6.8	8.5	9.8	11.1	12.4	15.5
2	8.1	0.8	1.0	1.1	1.6	2.0	2.3	3.3	3.9	4.6	5.2	6.5	7.5	8.5	9.5	11.5
1	5.1	0.4	0.5	0.6	0.8	1.0	1.1	1.6	2.0	2.3	2.6	3.3	3.8	4.3	4.8	5.8

SQT Value	SNR Threshold/dB	Full MiMo Rates to NETNode Phase 5 for each frequency bandwidth/Mbps														
		1.25MHz	1.5MHz	1.75MHz	2.5MHz	3MHz	3.5MHz	5MHz	6MHz	7MHz	8MHz	10MHz	12MHz	14MHz	16MHz	20MHz
6	23.1	n/a	n/a	n/a	n/a	n/a	n/a	22.4*	26.9*	31.4*	35.9*	44.9*	53.3*	61.7*	70.2*	87.0*
5	17.1	4.0	4.8	5.6	8.0	9.6	11.2	16.0	19.2	22.4	25.6	32.0	38.0	44.0	50.0	62.0
4	14.1	3.1	3.7	4.3	6.2	7.4	8.6	12.3	14.8	17.2	19.7	24.6	29.2	33.8	38.4	47.6
3	11.1	2.0	2.4	2.8	4.0	4.8	5.6	8.0	9.6	11.2	12.8	16.0	19.0	22.0	25.0	31.0
2	8.1	1.5	1.8	2.2	3.1	3.7	4.3	6.2	7.4	8.6	9.8	12.3	14.6	16.9	19.2	23.8
1	5.1	0.8	0.9	1.1	1.5	1.8	2.2	3.1	3.7	4.3	4.9	6.2	7.4	8.5	9.7	12.0

*Subject to hardware revision and frequency of operation

BENEFITS OF IP MESH

EASE OF INSTALLATION

DTC Mesh products create a self-forming, self-healing Mesh network as soon as power is applied to the node and it is within range of another node in the network. Each node simply requires a power source (12v nominal) and antennas to operate. This makes the system ideal for permanent or temporary deployment onto air assets, vessels, personnel or land-based stations participating in the operation, without the requirement for additional infrastructure.

EXTENDED RANGE

DTC Mesh nodes are available in 100mW, 2W and 5W variants which allows assets to stay connected to the network over long distances. Each node acts as a repeater, meaning that the range of the network can easily be extended by adding another node.

NETWORK EXTENSION

DTC's Mesh system is capable of extending the IP network by integrating other IP communication links, such as 4G and satellite communication. This combines Line-of-Sight (LOS) and Non-Line-of-Sight (NLOS) systems seamlessly to deliver data over a transparent IP network.

COST-EFFECTIVENESS AND FLEXIBILITY

With an RF network, recurring communications costs are reduced while optimizing operational flexibility by using multiple IP communication links or existing IP communications platforms. DTC's Airborne Mesh is a cost-reducing way to transport vital video, audio and data communications information in dynamic, mobile, maritime environment.

REAL-TIME STREAMING

Capable of transmitting live high-quality video across the network, with minimal delay.

OUR PROCESS

Solving challenging requirements is what we do best

ASSESS

Our technical consultants will conduct a detailed on-the-ground assessment of:
- Human needs
- Operational environment
- Opportunities and challenges
- Cultural context
- Scenario planning

DESIGN

Our field service team will then design a custom solution for those challenges, using the right hardware and software from Codan or one of our technology partners.

DEPLOY

Our specialist logistics team gets the hardware and the resources to wherever you are, getting your system up and running fast.

TRAIN

We'll train operators and communications staff on how to use the system – which will be a short process, thanks to our easy-to-use interfaces and interoperability.

SUPPORT

We're available to be deployed within 24 hours for any support required. And we're always on hand for any advice you require.

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ROBOTICS COMMUNICATIONS

DTC COMMUNICATION SOLUTIONS FOR ROBOTICS AND UNMANNED SYSTEMS

The rise in global demand for Robotic, Unmanned and Connected systems has created a requirement for innovative, reliable and secure connectivity solutions.

DTC is a pioneer in the creation of wireless RF Unmanned Communication solutions and has the experience, knowledge and capabilities to assist all areas of industry in meeting these challenges.
Our radio products are developed by a 60-strong engineering team based in the US and Europe, with combined expertise in RF, IP, PCB design, video encoding, equipment packaging and certification. We are renowned for developing a 'technical partnership' between the Unmanned platform design team and the radio supplier. We are also proven in service, with over 5,000 DTC radios on Unmanned Ground Vehicles (UGVs) in Defense, Law Enforcement and Public Safety applications.

Our technology solutions are available in both finished boxed product and OEM PCB formats to enable our customer to integrate their solution of choice seamlessly into their Robotics platforms.

DTC's COFDM technology provides unbeatable, robust and secure communication for UGVs around the world, repeatedly demonstrating Non-Line-of-Sight (NLOS) performance superior to competing solutions. With a comprehensive product portfolio, from simple digital video links to the latest IP Mesh and Software Defined Radio systems, DTC has a solution to meet every need.

SOLVING THE INTERCONNECTIVITY CHALLENGE

The requirement of the UAVs and downlinks for the secure and reliable transfer of video, audio, data, and general IP network traffic in real-time environments, has led DTC to create a suite of products to meet these challenges.

DTC has worked with platform manufacturers to address the key issues of latency, range extension and reliability on these systems.

Depending on the specific use case, our customers can utilize our MANET-proven Point-to-Point (P2P) COFDM technology for extreme low latency applications or our market-leading high-capacity wireless IP Mesh technology. The DTC Mesh offering is a true game changer in RF communications, offering IP connectivity with secure, seamless exchange of data with the additional capability to stream live HD video and audio. This is achieved by using COFDM RF technology to create a self-healing, self-forming IP network which can operate anywhere in the world, independent of existing communications infrastructure over significant ranges. Both P2P and Mesh are available in the DTC SOL8SDR, Software Defined Radio, where software applications allow remote changes from one single platform.

KEY FEATURES

IP MESH

- Fluid self-healing Mesh optimized for mobile applications
- Excellent range and NLOS capability
- Mesh networks with greater than 64 nodes in channel bandwidths as narrow as 1.25MHz
- Up to 87Mbps throughput
- Each node can act as a source of video, audio and generic IP data, as well as a repeater
- No central node in the network as each node is equal
- Ability to seamlessly link different Mesh networks over third party bearers
- Transparent IP network allows connection of any general IP device
- Auto adaptive modulation maintains connectivity in mobile applications
- Range of power outputs, mounting options and environmental housings to suit operational environments
- Optional end-to-end AES encryption
- Ability to build groups of Mesh to create a network
- Multipath IP Mesh nodes can provide an independent secure network.

COFDM POINT TO POINT

- One way video, audio, RS232 transmission over COFDM RF
- Excellent range and NLOS capability
- Narrowband width modes (2.5MHz, 1.25MHz, 0.625MHz) offer excellent spectrum efficiency
- Low latency (under 25mS) for critical applications
- Optional end-to-end AES encryption
- Low power solution for extended mission life
- Cost-effective
- Integrated telemetry links
- Unrivalled frequency bands.

APPLICATIONS

COFDM POINT-TO-POINT APPLICATIONS – UNMANNED GROUND VEHICLES

In an environment when time is of the essence, low latency communications are key. DTC Point to Point solutions are utilized by bomb disposal and search teams around the world to provide live time video and audio (under 25mS) and enable their users to make mission-critical decisions. DTC's solution offers reliable, narrowband connectivity in the harshest of RF environments. Video can be received on fixed or mobile receivers to offer complete flexibility.
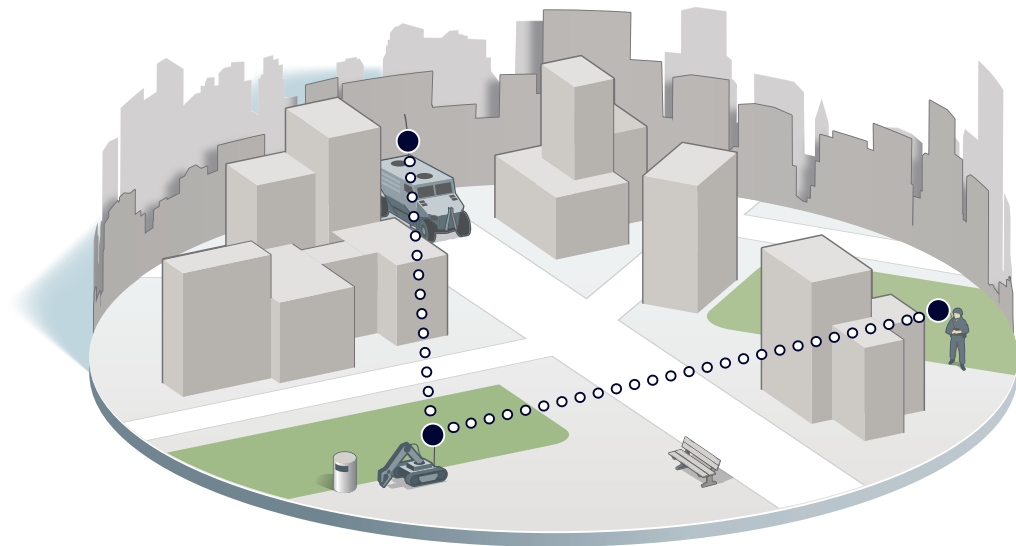

IP MESH APPLICATIONS – UNMANNED GROUND VEHICLES

IP Mesh radios offer high data rate connectivity to UGVs in difficult RF and operational environments. The fluid self-healing, self-forming Mesh architecture allows UGVs to exchange and relay mission-critical video and data, both between units and to command elements. Range can be extended by utilizing repeater units or other Mesh enabled assets.
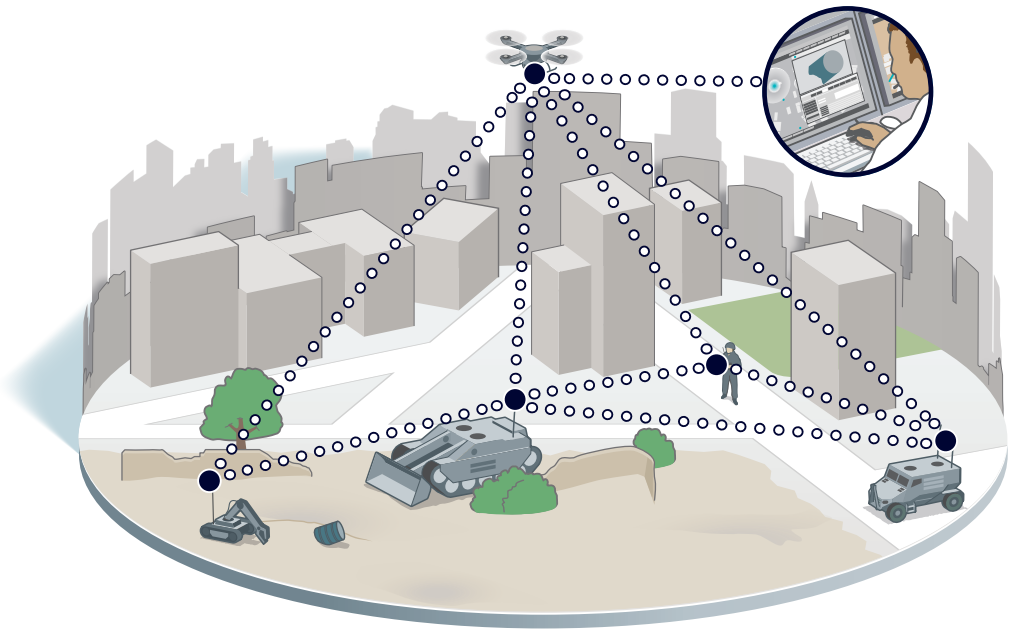
IP MESH APPLICATIONS- AUTONOMOUS SURFACE VESSELS (ASV) AND SENSOR PLATFORMS

IP Mesh technology is utilised for the command, control and monitoring of autonomous marine vehicles and sensor platforms. Self-forming networking allows for information retrieval from remote sensor platforms by air assets and also the protection of maritime borders by integrating the Mesh network with other sensor platforms. ASVs can be launched from a mothership and relay information between themselves and the command center.
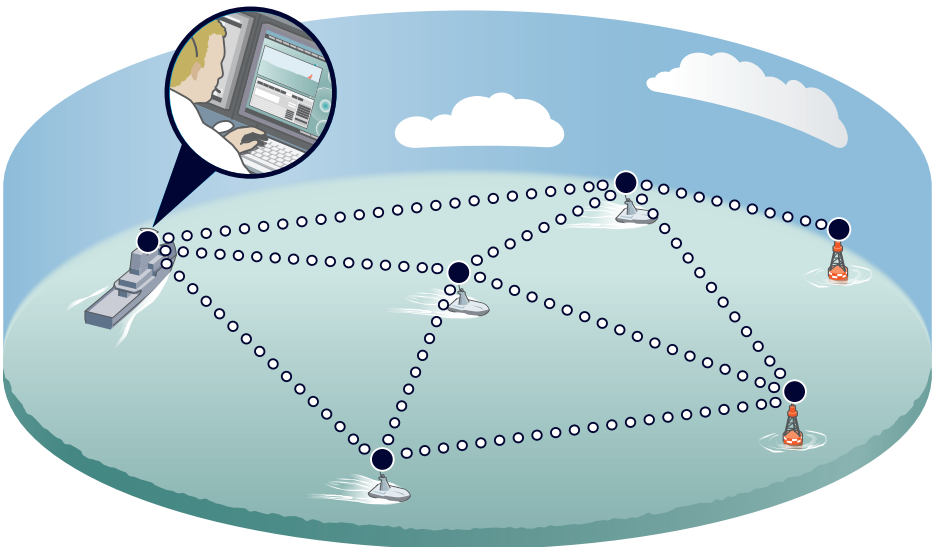
IP MESH APPLICATIONS- AUTONOMOUS CONNECTED VEHICLE SOLUTIONS

IP Mesh radios are used in Connected Vehicle solutions to transfer video and telemetry data both between vehicles and to control stations. DTC radios are currently used in vehicle testing and training environments around the world by leading manufacturers.