

DropCam-SDF

DropCam-SDR User Manual



Rapid Deployable Mesh Enabled Camera



DropCam-SDR

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Document History

Version	Date	Change Summary
v1.00	06/09/2022	Initial Draft
v2.00	14/03/2024	System Updates

Warranty and Support

All Visual Engineering products are supplied as standard with a 12 month 'Return to Base' warranty.

Please note: Any unauthorised product disassembly, modification or the removal of tamper proof labels will void the warranty.

In the event of a suspected product failure, users should contact the Visual Engineering support team on the telephone number +44 (0) 1206 211842 or please email us at:

support@visualengineering.co.uk

Should the fault persist or if the support team are unable to resolve the fault, it may be necessary to return the equipment.

Equipment should only be returned using the RMA (Returns Management Authorisation) process. Users should contact the support team on the above number and request an RMA number.

Safe Operating Procedure

- The equipment should be operated within the environmental limits as detailed in the <u>Specifications</u> section of this user manual.
- Only authorised and trained personnel should operate the equipment.
- There are no functions that require the user to gain access to the interior.
- Changes to the radio settings as described in the <u>Maintainer Guide</u> section should only be carried out by personnel that have had the appropriate training.



User Guide

Introduction

The DropCam-SDR is a Mesh enabled camera module which incorporates a DTC Software Defined Radio, a HD camera, a microphone, a flexible antenna pair and a battery.

The simple to use button interface allows the DropCam-SDR to be rapidly deployed.

Demand for system flexibility has led to Mesh being the first choice for transferring video. A digital Mesh radio network allows encoded video, audio and data to be shared between several nodes simultaneously.

COFDM point to point type RF transmission is also supported as a configurable option.

The video output is configurable as either HD or a standard definition windowed version of the video. SD video mode supports a solid state <u>PTZ function</u> by taking advantage of a 3x lossless digital zoom made possible by using the HD sensor as its source.

The DropCam-SDR also supports the option to connect IP and HD-SDI <u>external cameras</u> as its video source.

The transmitted video can be observed using the TM-RX Receiver partner product:

https://www.visualengineering.co.uk/tm-rx-mesh-receiver/p/1196

The DropCam-SDR can also be configured exclusively as a <u>Mesh relay node</u>. When coupled with high gain antennas it allows the connection of remote nodes that would otherwise be outside the network's RF coverage.

Activation of the unit can be configured to activate on <u>external trigger events</u>. It also incorporates four LEDs which can be either white light or infrared.

The housing is a very rugged CNC machined IP67 rated waterproof enclosure.

Security of the link is ensured either through standard DES encryption or optional AES128 or AES256.



DropCam-SDR Kit

The DropCam-SDR kit comes complete in a foam lined Peli flight case.

In addition to the DropCam-SDR the kit also includes two antennas, a configuration cable and a mains power adaptor.

The kit contents are shown here and listed below, along with their part numbers.



	Part Description	Part Number
1	DropCam-SDR 114150	110-0497
2	Antennas 1GHz to 1.5GHz	110-0190
3	Configuration Cable	110-0077
4	Mains PSU with Adaptors	110-8661
5	Documentation	110-8697



DropCam-SDR Features





Rear Connectors

The DropCam-SDR has two Fischer MiniMax connections on the rear. They are key specific to avoid incorrect cable use.

Remove the protective caps before use.

The top blue connector is used for battery charging with the mains PSU, included in the kit.

The bottom green connector supports connections to the embedded SDR Mesh radio.



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Battery Charging

The unit is charged by connecting the mains power supply to the blue Fischer power connector.

The status screen displays the progress of the battery charging.

A fully depleted battery will take approximately 3 hours to gain a full charge.

The status screen reports once the charging cycle is complete.





Connecting Antennas

The antennas are a push fit QMA type.

Click the antennas into position by inserting each antenna vertically downwards on to the antenna connectors.

To remove: Slide the connector's silver collar up and continue to pull the collar vertically upwards.



Avoid removing the antenna by pulling up on the antenna's black body as this can cause damage.





Powering On

A long press on the power button will start the boot up procedure.

At start up the status screen will display DropCam-SDR, as shown.

The initiation of the start up procedure is further confirmed by the unit producing a haptic vibration.

Status Screen Menus

The DropCam-SDR incorporates a simple to use status screen to monitor and configure user settings. Use the + control button to scroll through the available options, select an option using the power button.

Battery Level

The first status information screen displays the battery level, giving both a percentage of charge remaining and a time in minutes until empty.

Typically a full battery will power the DropCam-SDR for 3 hours this is when the Mesh radio is transmitting full motion video. This time can vary depending on the RF profile used.

Radio Presets

Following power on the Mesh radio will take a short time to initialise and establish a connection.

The radio presets are configured as described in the Maintainer Guide.

Use the + control button to scroll through the preset options, select a preset using the power button.













using an internal pull-up.

External Triggers

DropCam-SDF

<u>Connector Pin-outs</u> section. The trigger input (TRIG_INP) pin is active low. In continuous mode the DropCam-SDR will stay on as long as this pin is held low. It will then turn off when released, the pin is pulled high

In Timed mode, the unit will power up on a falling edge of the trigger and stay on for a defined amount of time; 20, 30, 90 or 120 seconds.

If external trigger control is required please contact support to discuss connector requirements for the interface cable.

support@visualengineering.co.uk

Video Quality

Configure the level of video quality to match the deployment.

Typically a reduced video quality selection will match a limited bandwidth radio link.

LED Mode

The DropCam-SDR incorporates IR and white LEDs. Activate either type by selecting the option in the menu. Selecting strobe mode will rapidly flash the white LEDs.

The control of the LEDs is achieved using the TM-RX Receiver partner product. This is described in the Viewer App section of the user guide, available here:

https://www.visualengineering.co.uk/supportdownload/53















Video Mode

The camera can output either HD or SD video.

By default the DropCam-SDR will always boot up in SD mode.

When SD video is selected it is possible to pan and tilt a SD video window around the higher resolution HD sensor frame. The camera's HD sensor also supports a 3x lossless digital zoom.

Video Mode:	SD	<	4
	HU		

March 2024

PTZ control of the SD video frame can be controlled using the joystick and the + and - keys on the TM-RX Receiver partner product.

This process is described in the **TM-RX Screens : Digital PTZ** section of the TM-RX Receiver user guide, available here:

https://www.visualengineering.co.uk/supportdownload/53

Powering Off

A long press on the Power Button will power the unit off.

In addition to the indication on the status screen the power down is further confirmed by a haptic vibration. POWER OFF



External Cameras

The rear connectors of the DropCam-SDR allows external IP and HD-SDI cameras to be connected to the Mesh radio as the video source.

If this feature is required please contact support to check for camera compatibility and for the necessary adaptor cable.

support@visualengineering.co.uk

Range Extender

In addition to the DropCam-SDR being used as a video source on a Mesh network it can also be used exclusively as a range extender.

Taking advantage of its portability, strategic placement of the DropCam-SDR can incorporate the connection of remote nodes that would otherwise be outside the network's RF coverage.

If the DropCam-SDR is used for this mode of operation the battery life can be optimised by switching off the internal video encoder.





Maintainer Guide

This section is intended for the Maintainer to configure the network and radios using the web browser control interface.

Web browser configuration of the Mesh radio is not required for normal operation and should only be undertaken to achieve the following:

- Change the system frequency
- Change the system IP addresses
- Change the Encryption key
- Switch the operating mode of the radio
- Understand the RF performance of the system better

Maintainers should be very careful when using this interface because it is entirely possible to make changes that will leave the system inoperable, requiring the system to be returned to base for repair.

Web Interface Access

Power up the DropCam-SDR and connect its configuration cable to the green Fischer connector, then connect the RJ45 connector end to a PC.

- Open a web browser on the PC
- Type the IP address of the unit e.g. 192.168.1.211 into the address bar
- The web browser will open a Login Prompt

To find IP address of radio in the DropCam-SDR or the TM-RX Receiver refer to the Radio App section of the TM-RX Receiver User Manual.

https://www.visualengineering.co.uk/supportdownload/53

If the link cannot be established to find the DropCam-SDR's IP address it will be necessary to use the **Node Finder Application**, it may be necessary to contact Visual Engineering for support in this instance:

support@visualengineering.co.uk



Login Prompt

Login authentication is required to connect to the SDR Mesh radio configuration pages. By default the user name should be left blank and the password is **Eastwood**



If a connection cannot be established with the login page it may be that the controlling PC is not on the same IP subnet as the radio. The following section describes how to set the PC to a specific IP address.



PC IP Address Configuration

For a direct Ethernet connection between the DropCam-SDR and a PC, it may be necessary to configure the PC's network adapter to use a static IP address, as described below.

- Open the Run app. (Press and hold Windows Key (W) on the keyboard, then press the "R" key)
- 2. Type the command "ncpa.cpl", then click OK.
- 3. Right click on the network adapter where the unit is connected to, then click "Properties". (If there are multiple adapters, the correct one can be identified by disconnecting the Ethernet cable, one of the adapters should now show "Network cable unplugged" upon reconnection it should eventually change to "Unidentified Network", this is the one connected to the system)
- 4. In the window that pops up, select "Internet Protocol Version 4 (TCP/IPv4)" then click "Properties".
- 5. Another window will now pop up, select "Use the following IP Address" and enter an IP Address on the same subnet as the system.
- 6. Click OK and Close

💘 Network Connections			- 🗆 ×
$\leftarrow \ o \ o$ \uparrow 🛬 > Control Panel > Network and Internet > Network	Connections	v ت	م
Organise • Disable this network device Diagnose this connection	n Rename this connection View status of this connection	Change settings of this connection	5- · 💷 📀
Ethernet Network cable unplugged Parallels VirtIO Ethernet Adapter	work Family Controller		
Ethernet 2 Status	📱 Ethernet 2 Properties 🛛 🗙	Internet Protocol Version 4 (TCP/IPv4) Properties	×
General	Networking Sharing	General	
Connection No network access IPv6 Connectivity: No network access Media State: Enabled Duration: 00:03:17 Speed: 100.0 Mbps Details Activity Sent Received Packets: 130 0	Connect using: Connect using: Configure This connection uses the following tems: Configure This connection uses the following tems: Configure This connection uses the following tems: Configure This connection uses the following tems: Configure Configure This connection uses the following tems: Configure	You can get IP settings assigned automatically if you this capability. Otherwise, you need to ask your network for the appropriate IP settings. Obtain an IP address automatically IP address: IP address: IP address: IP address: IP address: Default gateway: Obtain DNS server address automatically IP address: Default gateway: Obtain DNS server address automatically IP address: Obtain DNS server: Atternative DNS server: IM Atternative Server: IM Validate settings upon exit	retwork supports vork administrator 1 . 100 255 . 0 Advanced
Close	OK Canad	0	K Cancel

To re-configure to the original settings where the PC's IP address is obtained automatically follow the steps above except in step 5 select "Obtain an IP address automatically"

Page	1	4
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🖾 Run 🛛 🗙	
Type the name of a program, folder, document or Internet resource, and Windows will open it for you.	
Open: ncpa.cpl ~	
OK Cancel Browse	
Type here to search	-



Dashboard

The Dashboard is a summary page. The blue text icons are hyper-links which lead to pages where parameters can be viewed in closer detail or edited.

The **TM-RX Dashboard** below shows an active Mesh with one other active node on Preset 8.

$\leftarrow \rightarrow G$	○ 🔒 192.168.1.211					S 2 =
VE	NETNode Mesh IP Radio TM-RX		-\\\ Single Mesh 🔞 (A) 1850 MHz 	 ♥ Wired Connection ● Update Local Unit 	Only	Preset 🚺
aatboard Dashboard Apps マ U Status マ Clabel Seture 7	unit InFORMATION Unit name IP address Voltage Temperature	● EDIT TM-RX 192.168.1.211 13.8 V 44 ºC	নীয়া Network Status Network OK: A mesh h 2 Active No	▶ 60 TO SPECTRA as been formed des.	ACTIVE PRESET Preset 8 POPULAR PAGES D. Remeter/Remultion	ULEAR.
Presets V	Tx retries		🚺 Apps Bar	國法國	Apps/Tactical Display	
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			🕚 Security Status	♦ GO TO SECURITY SETUP		
		, i	Data encryption Streamer 1 video encry	not active. ption not active.		

Select **Status>Node Table** to list all active nodes on the Mesh network.

VE	NETNode Mesh IP Radio TM-RX		₩ Single Mesh 🔞 🖗	(<mark>2)1850 MHz</mark> 🚭 2 of 16		 Wired Connection Update Local Unit Only 		Preset 8
Status / Node Table	🖽 Node Table					🧿 Summary	🔿 Detailed 🔿 Vi	deo 🔿 Interli
🖪 Apps 🗢	SUMMARY VIEW							
H Node Table	ID Unit Name	IP Address	Battery	Temp	Software version		Occupancy	Tx Retries
Quality Matrix	0 TM-RX			50 °C	7.2.3]	
Levels	1 TM-K9	192.168.1.221			7.2.3		1	
X System Light ● Dark A admin C> Locour 1 v72.3								

The only other node on the network is named TM-K9. Click on the IP Address to access its Dashboard.



The **TM-K9 Dashboard** below displays the Mesh node status.

VIDEO 1 preview displays the active main camera feed.

VIDEO 2 preview displays a test bars signal since there is no external camera connected.

NETNode IP Radio	× NETNode IP Radio	× +			~	- 0 ×
$\leftrightarrow \rightarrow c$	0 8 192.168.1.221					
VE	NETNode Mesh IP Radio TM-K9		- 🗰 Single Mesh 🔞 (%) 1850 MHz 	🖬 Over radio link 💿 Update Local Uni	it Only	Preset
Bashboard ② Dashboard ■ Apps ↓↓ Status ③ Global Setup ■ Presets	UNIT INFORMATION Unit name IP address Voltage Temperature Tx retries	► EDIT TM-K9 192.168.1.221 13.8 V 44 PC 0	-tc: Network Status Network OK: A mesh 2 Active †	▷ 60 TO SPECTRA has been formed. addes. 쇼앙 太 函	ACTIVE PRESET Preset B Popular pages	LLEAR
System Light Dark A admin C Locout V12.3	NESH INFORMATION Mesh ID Node ID Total nodes Occupancy RENOTE NODES © 00: TH-RZ [2]	• STATUS 39 1 2 of 16 • LOCATE	Streaming Capture VIDEO 1 STGP Electrical Capture Recording START	O D TO STREAMING STATUS WORD 2 FLAT FLAT		
		×	Security Status Idata endsyddin Streamer 1 video end Streamer 2 video end	 eo to security setup indi active. yption net active. 		

Mesh Settings

The control page below can be used to control and configure a Mesh node.

Browse to the **Presets>Mesh Settings** tab.

The RF channel on the selected Mesh node can be changed from here, select the required channel and Activate.

□ NETNode IP Radio ← → C	× NETNode IP Radio × + ○ 役 192.168.1.221/wui_presets/mesh			£	v - o ×
VE	NETNode Mesh IP Radio TM-K9	-₩+ Single Mesh @ 39 📀 3	♥ ⁽¹ A ¹⁾ 1850 MHz 1 =\$2 2 of 16	 Over radio link Update Local Unit Only 	Preset
Presets / Mesh Settings C Dashboard Apps V	🔩 Mesh Settings :8		5 6 7 18 9 10 11 12 13 14 15 16 >		BLI MART I I CANCEL C REFRESH
 It status Solobal Setup Presets Stratiss It whit Settings Unit Settings Takback / Voice Security Encoders Audia Noise Strainers Data Advanced System Light Dark Light Dark Locour V/2.3 	HESH SETTINGS Operating mode Mesh ld Operating range Advanced Settings	Single Mesh 38 1 50km • No	TRANSMITTER Transmitter Frequency Channel bandwidth Dutput attenuation RF output port PA linearity Interference avoidance		IN PHI2 WHI2 B B WHI2 B B B B B B B B B B B B B



Key RF Settings

The highlighted options in the Mesh Settings page are the key points to consider when configuring the RF channel, as described in the table below.

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$\leftrightarrow \Rightarrow c$	🛇 👌 192.168.1.221/wui_presets/mesh					\$	ອ 🛓 ຊາ 😑
VE	NETNode Mesh IP Radio TM-K9		-\\\ Single Mesh 🕡 '\\ 1850 MHz 💮 39 💿 1 😪 2 of 16	1. A.	 Over radio link Update Local Unit Only 		Preset
Presets / Mesh Settings C Dashboard Apps ~	-& Mesh Settings :8		< 1 2 3 4 5 6 7 🖪 9	10 11 12 13 14 15 16 > AC		B WY @ CARCEL	C REFRESH
🕪 Status 🗢	MESH SETTINGS Operating mode	Single Mesh		TRANSMITTER Enable transmitter	Yes		
Presets A settings	Mesh Id 4 Node Id 5	39 1	8	Frequency 2 Channel bandwidth 3	1850 2.5		C MHz
Unit Settings Calkback / Voice Calkback / Voice	Operating range Advanced Settings	50km No	*	Output attenuation RF output port	0 A + B		© dB
Image: Encoders ♥ ↓ Audio ♥ ((••) Streamers ♥				PA linearity Interference avoidance	High Off		•
Uata ♥ ®\$ Advanced ♥ X System ♥	COPY PRESET 8				▷ GENERAL SETTINGS ▷ UN	IT SETTINGS ▷ TALKBACK / VOICI	
Light 🥌 Dark							
C> LOGOUT							
11 1120							

ltem	Description
1 Enable transmitter	Slide to Yes to switch the transmitter on. All nodes in a Mesh must have their transmitters enabled.
2 Frequency	Type in the frequency to use for the Mesh. This must be the same for all units.
3Channel bandwidth	Select the bandwidth to use for your Mesh from the drop-down list. This must be the same for all units.
4 Mesh Id	Type in a Mesh ID, this must be the same on all units in the Mesh network. The Mesh ID sets which Mesh network the unit belongs to. All nodes on a particular Mesh ID can communicate with each other.
S Node Id	Type in a Node ID for each node. The node ID must be unique in the Mesh network. Note : A node can automatically reassign its Node ID at power up if it finds a conflict with an existing node.
6 Save or Cancel	Once values have been set, click Save to commit to the changes or Cancel to revert to the existing configuration.



Additional RF Settings

In addition to the key parameters the table below describes additional parameters in the Mesh Settings page that can also be used to optimise the RF performance.

ltem	Description
Output attenuation	The level of attenuation in dB applied to the output. Can be useful if the transmitter is swamping a second unit nearby.
RF output port	Selects which of the two output ports (or both) is to be used as a transmit port.
PA linearity	High linearity, improves RF quality at the expense of power consumption. Low linearity will have some saving in power consumption.
Interference Avoidance	Switches frequency automatically when channel interference is experienced. If master mode is selected, the transmitter frequency is replaced by a Set button. If clicked, up to eight preset frequencies can be entered which are followed by all other Slave nodes in the network.
Operating Range	A larger range allows the Mesh network to operate over a bigger distance at the expense of bit-rate.

Security

The security page can be used to configure the unit's encryption keys for the data channel and the two video streamers. DES encryption is standard with other types licence dependant. Browse to the **Presets>Security** tab.

NETNode IP Radio	X NETNode IP Radio X	+			~ - 6 X
	NETNode Mesh IP Radio	- We Single Mosti 🛈 👼 72 - 10 1	(A ¹⁰ 060 002 € 2 0 18	 Even with tink Update Local Unit Unity 	tar v v v v v v v v v v v v v v v v v v v
Presets / Security	🔓 Security :8				🖸 SAVE 🞯 CANCEL 🖸 ATTEN
ter Anthe Status © Gittiläl Satup ↓ Neah Satunga © Unit Satunga © Takhacek / Yaloo		DES Set Kors Def			, O
Accurity Actin (*) Creamers Actin (*) Creamers Advinces Advinces Light ● Dark 2 admin € Locour 1 v12.3	Type Kry vertions E	Off. PEncryption Key Entry Storkey 190701 01234567990123 CLEAR ALL ZERO ALL	SHOW/HIDE DK CANDEL		H-7 - K-3-MORANG (ATHREE - CO-MARAMORI A VIII.)



Signal Levels

This page gives an overview of the signal quality around the Mesh system. Typically SNRs > 15 are very good. The number will reduce as the unit goes out of range or interference is present. If there are more than two Mesh nodes in the network the system will automatically find a new path to route the signal.

Browse to the Status>Levels tab.

NETNode IP Radio	X NETNode IP Radio X +			~ - o ×
$\leftarrow \ \rightarrow \ \mathbf{C}$	🔿 👌 192.168.1.211/wui_status/levels		습	© <u>±</u> £ ≡
VE	NETNode Mesh IP Radio TM-RX	-₩ŀ Single Mesh 💿 '/R' 1850 MHz 🛞 39 📀 0 🖏 2 of 16	🗘 Wired Connection Update Local Unit Only	Preset 🛄 8 🐙
Status / Levels	巅 Levels		(SNR 🔿 Levels 🔿 Metrics
Apps My Status	SNR			
🖽 Node Table	Rx/Tx			
Uuality Matrix	0		24.3	
······································		28.5		
(••) Streamers	s			
😳 Global Setup				
Presets				
🔀 System				
Light 🛑 Dark				
🙁 admin				
C> LOGOUT				
and the second second				
U v7.2.3				
			Þ NODE TA	

This spectra page below gives a graphical view of the RF channel. The interference graphs can be a very useful tool to detect any other users occupying the spectrum, which will ultimately result in glitches in the RF channel performance.

The RF signal graph of the remote node underneath gives a colour graded overview of the level of the COFDM signal.





Video Encoders

The two video encoders in the DropCam-SDR are configured to match the system hardware. On screen display information can be added if required. Most other parameters are not normally required to be changed unless re-configuring the system or fault finding.

NETNode IP Radio		× NETNode IP Radio ×	+				~ ~ Ø X
$\leftarrow \rightarrow c$		0 👌 192.168.1.221/wui_presets/encode	ers/1			ź	> ⊗ ≰ £ ≡
VE		NETNode Mesh IP Radio TM-K9		₩ Single Mesh 😻 🖄 1850 MHz 🛞 39 📀 1 🕏 2 of 16		🗃 Over radio link 이 Update Local Unit Only	Preset
Presets / Encoders / Encoder 1		Encoder 1:8		< 1 2 3 4 5 6 7 B 9	10 11 12 13 14 15 16 >		2) Myc 🕲 (Mich) 📿 REFRESH
- Status		ENCODER OPTIONS			ENCODER MODE		Advanced 🦲
🧐 Global Setup		Video source	SDI 1		Encoder mode	Low delay	
Presets		Video format	Automatic	+	De-interlace video	No No	
-& Mesh Settings		OSD position	Off	*	SD widescreen	●■ No	
2 Talkback / Voice		OSD type	Date Time	•	Sub-horiz resolution	1/2	👻 640px 🕕
Security					Sub-vert resolution	1/2	🔫 360px
Encoders Encoder 1					Sub frame rate	Full	✓ 25fps
Encoder 2 U Audio		JPEG PREVIEW			TEST PATTERN		
((•)) Streamers		Sub sampling	1/4		Generator control	Auto video	
Uata QC Advanced	•	Picture quality	45	<mark>☉</mark> %.	Pattern mode	Moving pattern	
💸 System		Frame period	200	🖸 ms			
		Event overlay	🥌 On				
Light 🤍 Dark		-					
🙎 admin		COPY PRESET 8					
C LOGOUT							
ID							
U VI.2.3							

Video Redistribution

The DropCam-SDR video streams can be played in a suitable media player connected to the network. Check the URL addresses in the **Status>Streamers** page as highlighted in the example below.

NETNode IP Radio	× +					~ - 0 X
$\leftarrow \rightarrow \mathbf{C}$	O 🔒 192.168.1.221/wui_s	status/streamers			ដ	ම 🛓 දු =
VE	NETNode Mesh IP Radio TM-K9		₩ Single Mesh 😻 (%) 1850 MHz 💮 39 💿 1 😪 2 of 16		Over radio link Over radio link Oupdate Local Unit Only	Preset
Status / Streamers	(0) Streamers				O Details	O Streamer 1 O Streamer 2
🖪 Apps 🗢	SERVICE 1			SERVICE 2		REFRESH
Status	VIDEO 1		▶ ENCODER SETTINGS			▶ ENCODER SETTINGS
Houe rable Duality Matrix 소설 Levels (아) Streamers 공급 Connected Devices 행 Giobal Setur) 오	Source Bitrate Quality JPEG NO AUDIO	Automatic SDI 1 1:43 Mbps LoD 640x360p 25fps http://192.168.1.221/image.jpg?i=1 🗔 🗂		Source Bitrate Quality JPEG NO AUDIO	Automatic SDI 2 (powered) 2.11 Mbps LoD 360x240p 29fps http://192.168.1.221/image.jpg?i=2 ⊡s 👛	⊳ Audio Settings
🔲 Presets 🗢	MUX 1		▶ STREAMER SETTINGS	MUX 2		▶ STREAMER SETTINGS
X System	Source Bitrate Encryption TS	Service 1 1.50 Mbps Off udp://@239.50.60.221:10001 📋 1		Source Bitrate Encryption TS	Service 2 2.20 Mbps Off udp://@238.50.61.221:0011 📋 📿	
C> LOGOUT	RECORDING / SD CARD			MESH		SECURITY SETTINGS
() v123	Source Bitrate Encryption Available	None None None 104.7 6B		Encryption	QYT d' nude table d qual	JTY MATRIX & LEVELS & SPECTRA



VLC Playback

The VLC is a free media player which can be used to playback the video stream. From the Media menu select the 'Open Network Stream' and enter the URL stream as shown in the example below.

🛓 VLC media player		-	□ ×
Media Playback Audio Video Subtitle Tools View Help			
▲ Open Media ● Price Process ● Price Price ● Price Price	Hetmork C Capture Device		
Show more options			
	Play v Cancel		
			0%

The video can be monitored on the local network connected to the Mesh or remotely monitored through a back-haul system, as described in the <u>Mesh Networks</u> section.





Edge Recording

The SDR radio in the DropCam has an integrated 128GB SD card that can be used for video recording. The configuration of this feature is on the **Status>Streamers** page. Downloading and viewing of the files is supported using DTC software tools.

To enable recording first select a Streamer instance. NETNode IP Radio × + 0 X C O 192.168.1.221/wui ⊙ 🕹 එ = 5.7 NETNode Mesh IP Radio Single Mesh 🜒 ('A') 1850 M Over radio link
 Update Local Unit Only 8 (••) Streamers O Details 🧿 Streamer 1 🔿 Streamer 2 Dashboard MOTION DETECTION Show Full Width Quality Matrix 👬 Level 😤 Connected D Global Setup STREAMER 1 STATUS Recording enabled STAR Video locked 1234 Light *Contemporal* Dark Audio locked SDI audio groups $\Box\Box$ ASI locked

Recordings are controlled by clicking the Start/Stop button.

The control of the recording can also be made through the **Presets>Streamers>Streamer1** menu.

To view recordings it is necessary to use the Domo Video Download Tool (DVDT), which is a software application that can be used to download and convert files from DTC products.



Audio Encoders

The audio encoders in the SDR radio are configured to achieve two way audio between the TM-RX Receiver and the DropCam-SDR. In the example configuration below the sent audio from the TM-RX Receiver is on channel 1, the TM-RX received audio is on channel 2.

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VE	TM-RX		Single Head W 1000 HHZ		 Update Local Unit Only 		8
resets / Talkback / Voice Dashboard Apps	Talkback / Voice :8		< 1 2 3 4 5 6 7 B 9	10 11 12 13 14 15 16 >			NCEL 📿 REFRESH
🕪 Status 🗢	TALKBACK AUDIO SETTINGS			SEND & RECEIVE CHANNELS			
😳 Global Setup 🗢 🗢	Enable Talkback / Voice	Local headset		Send channel	Channel 1		
🗏 Presets 🗠	Mic on right channel	🔍 Yes		Receive channels		2 3	
• & Mesh Settings	Noise suppression	🤍 Yes					
2 Talkback / Voice	Echo cancellation	🤍 Yes				10 11	
Encoders 🗢	Side tone	• No			13	14 15	16
Q Audio	Disable voice cue	TES CONTRACTOR					
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🗙 System 🔍 🗸	Microphone gain	*					
Light 🤲 Dark	Mute level		e e				
e admin	Headphone gain						
C> LOGOUT	TET (COPY PRESET 8				6 AUDIO 6		
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Conversely the sent audio from the DropCam-SDR is on channel 2, the received audio is on channel 1, as shown below. This configuration is typical of a simple audio pairing between the two.

NETNode IP Radio	X NETNode IP Radio X	+				~ -	- 0 ×
$\leftarrow \rightarrow c$	🔿 👌 192.168.1.221/wui_presets/voice					☆	± ຊ ≡
VE	NETNode Mesh IP Radio TM-K9		₩ Single Mesh 🔞 🕅 1850 MHz 💮 39 💿 1 😪 2 of 16		 Over radio link Update Local Unit Only 		Preset
Presets / Talkback / Voice Dashboard Apps 🗢	Stalkback / Voice :8		< 1 2 3 4 5 6 7 🖪 9	10 11 12 13 14 15 16 > /		🖻 MAYE @ CANCEL	C REFRESH
📲 Status 🗢	TALKBACK AUDIO SETTINGS			SEND & RECEIVE CHANNELS			
🧐 Global Setup 🗢	Enable Talkback / Voice	Local headset	+	Send channel	Channel 2		-
Presets	Mic on right channel Noise suppression Echo cancellation Side tone Disable bleep Disable voice cue TALXBICK AURIO LEVELS Microphone gain	 Yes Yes Yes Yes Yes Yes Yes 	• •	Receive channels	1 2 5 6 8 10 13 14	5 7 15	4 8 12
Light 🔲 Dark 😤 admin	Mute level Headphone gain	Q • • • • • • • • • • • • • • • • • • •	ي م				
€> LOGOUT] v72.3	E 🛞 COPY PRISET 6				► AUDUO ► MES		

There are many possibilities to configure the audio matrix where audio from multiple nodes in the Mesh network are received by a single node. For example, many DropCams to one user or many users on an open channel. Care should be exercised to keep careful track of such system configurations as multiple audio crossovers could lead to confusion.



JSON Configuration

{

The DropCam-SDR supports the upload and export of selected settings via the Java Script Open Notation file format. ISON files can be uploaded using the File Uploader Application.

The File Uploader application can be used to configure selected DropCam-SDR settings, below are example files in JSON format. The file must have the name: "UserSettings.json"

Upload User Settings Example File

The file must have the name: "UserSettings.json".

```
"Display DarkBoot": {
   " Value": false
  },
  "Display_AutoBacklight": {
   " Value": false
  },
  "Display BacklightBrightness": {
    " Value": 60
  },
  "Apps BootApp": {
    " Value": "Viewer"
  },
  "JoystickButtons VibrationFeedback": {
    " Value": true
  },
  "Network IpAddress": {
    " Value": "192.168.1.243"
  },
  "Network SubnetMask": {
    " Value": "255.255.255.0"
  },
   'Network_DefaultGateway": {
    " Value": "192.168.1.254"
  },
  "Telemetry_GroupID": {
    " Value": 12345
  },
  "Telemetry_ExternalModule": {
    " Value": false
  },
  "Recording_Record": {
    " Value": false
  },
  "CursorOnTarget_Enable": {
    " Value": false
  },
  "CursorOnTarget ServerAddress": {
    " Value": "127.0.0.1"
  },
  "CursorOnTarget ServerPort": {
    " Value": 18122
  }
}
```

Upload Camera Settings Example File

The file must have the name: "Camera##.json" Where ## is equal to the camera number.

```
{
  "Enabled": {
    "_Value": false
  },
  "ConnectionType": {
    " Value": "MESH"
  },
  "CameraName": {
    " Value": "Camera"
  },
  "TelemetryAddress": {
    " Value": 0
  },
  "Radio Preset": {
    "_Value": 1
  },
  "Encoder_Stream_Address": {
    "_Value": "192.168.1.212"
  },
  "Encoder Stream_Mode": {
    "_Value": "UDP (DTC)"
  },
  "Encoder Stream Multicast Address": {
    "_Value": "239.50.60.212"
  },
  "Encoder_Stream_Port": {
    "_Value": 10001
  },
  "Encoder_Stream_Custom_MRL": {
    "_Value": ""
  },
  "Encoder_Stream_Custom_TCPUDP": {
    "_Value": "TCP"
 },
  "Encoder CacheSize": {
    "_Value": 100
  },
  "CameraModel": {
    "_Value": "TM-K9"
  }
}
```



File Uploader

The File Uploader is a PC software application which supports JSON configuration files to be uploaded to the DropCam-SDR.

The File Uploader application can be downloaded from the following location:

https://www.visualengineering.co.uk/supportdownload/51

- Start the downloaded executable.
- Ensure the PC and DropCam-SDR are on the same IP subnet. To find IP address of the DropCam-SDR or the TM-RX Receiver refer to the Settings App section of the TM-RX User Manual.
- Enter the IP Address of the DropCam-SDR into the File Uploader software.
- Browse to the file to be uploaded from the PC to the DropCam-SDR and press the "Upload File" button.

🥪 VE File Uploader 📃 🗖 🗙					
	102 100 1 210				
IP Address:	192.168.1.210		_		
Upload File:				Browse	
	Uplo	ad File			



Mesh Networks

In in a Mesh network each node acts as an independent router. This allows for continuous connections and reconfiguration around broken or blocked paths by hopping from node to node until the destination is reached.

All nodes in a Mesh network are required to be on the same frequency and share the same Mesh ID.

Mesh networks are self-forming and self-healing which means that the network can still operate when a node or connection fails. This results in a network that is very reliable as there is often more than one path between a source and a destination.

The Mesh network constantly assesses which nodes are in range and the best routing to use.

A group of nodes automatically form a network at power on. All nodes detect each other and a network is formed. If a node fails or is out of range the network will find an alternative routing path. Connectivity is thus preserved automatically.

Mesh Topologies

Two Node Network

In its simplest form the Mesh network includes a single TM-RX Receiver and a single DropCam, resulting in a Mesh network topology as shown here. As more nodes get introduced to the system the network map will take on different forms.



Chain Network

Mesh nodes chain together to extend the network range or navigate around obstacles. In this example the video from the DropCam is received at by both TM-RX units. Since the link between the DropCam and TM-RX2 is blocked by the building the link between the two is channelled through TM-RX1.





Interlinked Network

DropCam-SD

As Mesh nodes are added the network map expands. As shown in this example the addition of the Mission Command node added to the previous configuration now gives two active paths between the DropCam and TM-RX2.

The vehicle based MC node can be any active Mesh node such as an additional TM-RX or a DropCam equipped with high gain antennas.

Additionally, the MC node also allows the option to extend the Mesh network to any remote location through a 5G connection or a satellite link.

This allows the playback of any video feed in the Mesh network at a remote location. This configuration is described in the <u>Video Redistribution</u> section.



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Combined Network

If two separate networks are incompatible or operating at different frequencies, they can be combined at the IP layer as long as they belong to the same Mesh ID and share the same IP address subnet.

In the example below the red group Mesh network and the green group Mesh network are operating on separate frequencies. By including the Mission Command common receive point these two groups can be combined using a wired IP connection.





System Configuration

Using the networking principles outlined above together with a good understanding of how to configure Mesh nodes as outlined in <u>Key RF Settings</u> it is possible to adjust the configuration of the system to meet the exact field requirements.

It should be noted that there is a limitation of a **maximum of 16 nodes** that can be supported by a single Mesh network. Furthermore bandwidth planning is important when populating a Mesh network, especially when attempting to stream multiple video streams simultaneously using a low radio bandwidth. In this circumstance the bandwidth limitation can be somewhat mitigated by reducing the video encoding rate.



Care should be exercised when making far reaching changes away from the factory configuration. In the absence of a good system understanding it is entirely possible that certain changes could leave the system inoperable, requiring the system to be returned to base for repair.

As a precautionary measure before changing the system's configuration it's a good plan to back up the system by exporting its settings using <u>JSON Configuration</u>. If required, JSON configuration files can be used to recover the system back to a known working state.

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The two connectors on the rear of the DropCam-SDR are Fischer MiniMax type. Details of the pinout of both connectors are described below.

Pin-outs

Charging - Blue Connector				
Pin Number	Signal			
1	SDA			
2	ETHTX-			
3	ETHTX+			
4	232TXD			
5	VCC12V0			
6	SCL			
7	ETHTX+			
8	SDI_INPUT_2			
9	GND			
10	ETHRX-			
11	232RXD			
12	TRIG_INP			

SDR Radio - Green Connector				
Pin Number	Signal			
1	NC			
2	ETHTX2-			
3	ETHTX2+			
4	USB D+			
5	VCC12V0			
6	AUDIO_OUT			
7	ETHTX2+			
8	MIC_INPUT			
9	GND			
10	ETHRX2-			
11	USB D-			
12	USB_5V			



DropCam-SDR

Specifications

Specifications			
Camera Sensor	3.1 Megapixel, CMOS	External Camera Inputs	IP, HD-SDI
Camera Sensitivity	< 0.1 Lux	External Triggers	Input
Camera SNR	> 50dB	Cable Connection	Ethernet
Horizontal FOV	120°	Configuration	Web Interface
RF Frequency	L-Band, S-Band, C-Band	LEDs	4 x White or IR
RF Type	COFDM Mesh and PtoP	Setup Interface	Button
Pan Tilt Zoom	Supported in SD Mode	Status Screen	OLED
Video Encoder Control	Relay Node Configurable	Integral Battery	Rechargeable
Video Encoding	H.264	Max Charge Time	3 Hours
Audio	High Quality Microphone	Run Time - FMV	3 Hours
Encryption	DES, AES128, AES256	Weight	600g
Antennas	Flexible Dual Diversity	Environmental	IP67
Antenna Connectors	QMA	Dimensions	135 x 55 x 55 mm



Dimensions

All dimensions are in mm



Front







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Тор

