

# Nu Link

Wireless Technology and Solutions



## SMART PRIVATE 5G NETWORK



## ► PROOF OF CONCEPT

### CASE STUDY

FIS WOMEN SKI WORLD CUP 2022  
LENZERHEIDE  
5-6 March 2022



**NuLink DEPLOYED THIS PoC SWISSCOM  
EVENTS & SOLUTIONS TO PRESENT TO FIS,  
SUNRISE, NEP, FIFA, SSR-SRG HOW TO  
PRODUCE A LIVE ENTOURAGE BROADCAST  
WITH A 5G PRIVATE NETWORK AND  
5G AUDIO-VIDEO-DATA DEVICES**

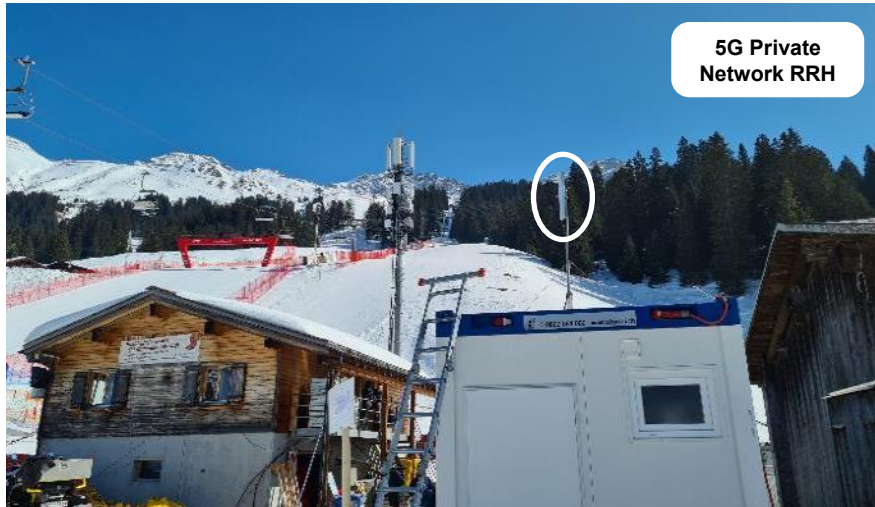


## **PRIVATE 5G NETWORK (STAND ALONE VERSION)**

**PRESENTATION TO SWISSCOM – FIS – SUNRISE – NEP – FIFA – SSR-SRG**

### **Deployment**

- ✓ TDD channel in band 42 (50 MHz channel bandwidth)  
150Mbps UL et 100Mbps DL
- ✓ 5G Handheld CX-350 NDI Camera (NDI-HX at 16 Mbits)
- ✓ 5G Tripod CX-350 NDI Camera (NDI-HX at 16 Mbits)
- ✓ 5G PTZ 100 NDI Cameras (NDI-HX at 16 Mbits)
- ✓ 5G CX-4000 Camcorder (HEVC ULL at 10 Mbits)
- ✓ 5G Audio-video Reporter (microphone / N-1 headset / return video)
- ✓ 5G Loudspeaker
- ✓ 5G TV Monitor
- ✓ 5G Nikon D6 Still Camera for photographer
- ✓ 5G Intercom with 4 smartphones (Unity system)
- ✓ 5G Private Network with 250 mW (TX power)
- ✓ Coverage 300 meters from main 5G Antenna





## **PRIVATE 5G NETWORK (STAND ALONE VERSION)**

**PRESENTATION TO SWISSCOM – FIS – SUNRISE – NEP – FIFA – SSR-SRG**



**5G Handheld  
CX-350 Camera**



**5G PTZ Camera**

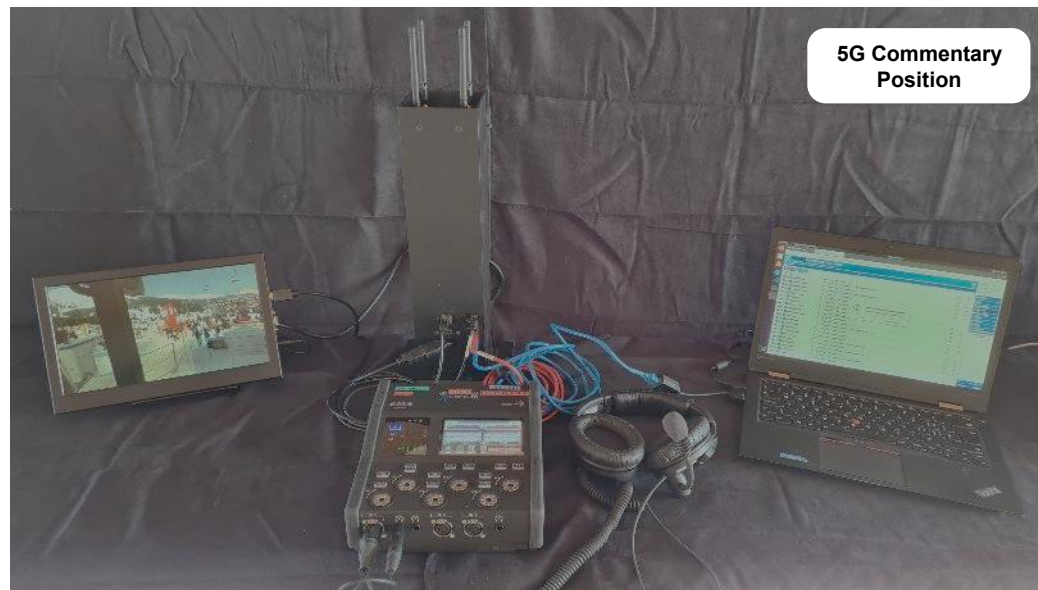


**5G Tripod  
CX-350 Camera  
With Prompter  
and Return Video**



## **PRIVATE 5G NETWORK (STAND ALONE VERSION)**

**PRESENTATION TO SWISSCOM – FIS – SUNRISE – NEP – FIFA – SSR-SRG**



## ► PROOF OF CONCEPT

### CASE STUDY

PARIS-2024 OLYMPICS

PULSE

1 June 2022



**NuLink DEPLOYED THIS PoC FOR ORANGE EVENTS TO PRESENT TO IOC, OBS, P2024, RIGHTS HOLDER BROADCASTER AND PRESS AGENCY HOW A PRIVATE 5G NETWORK DEPLOYED ON OLYMPIC VENUES COULD DELIVER INNOVATIVE WIRELESS SERVICES**





## **PRIVATE 5G NETWORK (STAND ALONE VERSION)**

**PRESENTATION TO IOC – OBS – PARIS-2024 – BROADCASTERS – PRESS AGENCIES**



## ► PROOF OF CONCEPT

### EXHIBITION IBC-2022

AMSTERDAM RAI  
9–12 September 2022



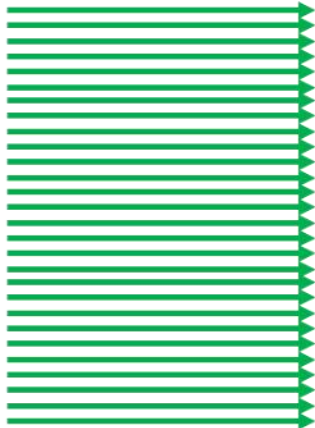
**NuLink SHOWCASED ITS 5G STAND ALONE  
PRODUCT LINE FOR PMSE AT IBC-2022.  
IT WAS THE UNIQUE END TO END SOLUTION  
PRESENTED AT THE SHOW, INTEGRATING ALL  
THE DEVICES A VENUE NEEDS TO DEPLOY  
FOR A LIVE COVERAGE**





## **PRIVATE 5G NETWORK (STAND ALONE VERSION)**

**PRODUCT LINE FOR PMSE**



**28 Frequencies (UHF / SHF)  
needed to operate all these  
equipment with existing  
wireless solutions.**



**Only a single 5G Full Duplex  
TDD Channel (100 MHz)  
to operate all these equipment**

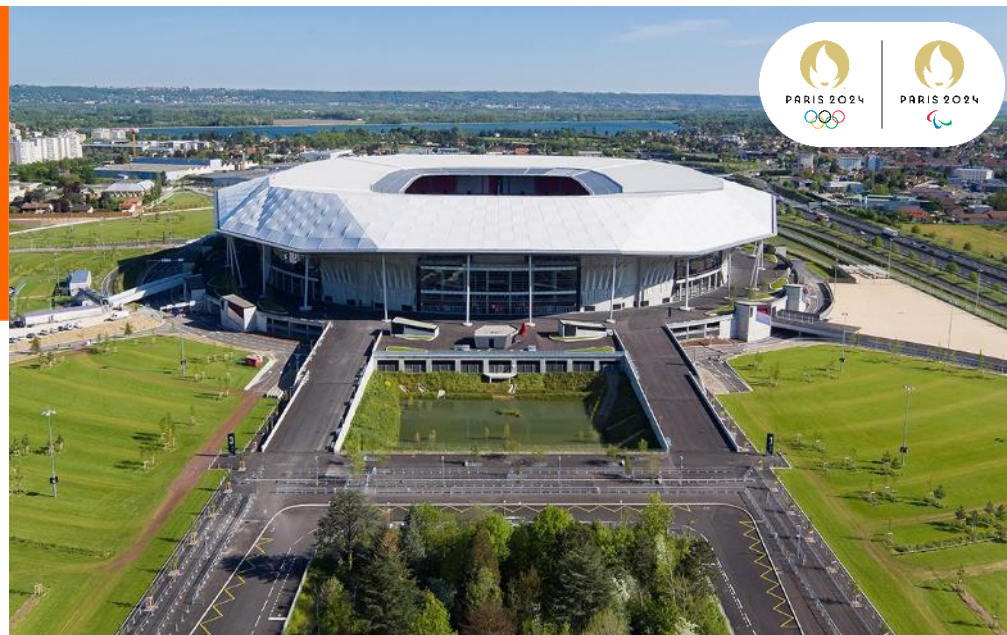
## ► PROOF OF CONCEPT

### CASE STUDY

PARIS-2024 OLYMPICS  
LYON GROUPAMA STADIUM  
7 October 2022

orange<sup>TM</sup>

**NuLink DEPLOYED THIS PoC FOR ORANGE  
EVENTS TO PRESENT TO IOC, OBS, P2024,  
RIGHTS HOLDER BROADCASTER AND PRESS  
AGENCY HOW A PRIVATE 5G NETWORK  
DEPLOYED ON OLYMPIC VENUES COULD  
DELIVER INNOVATIVE WIRELESS SERVICES**



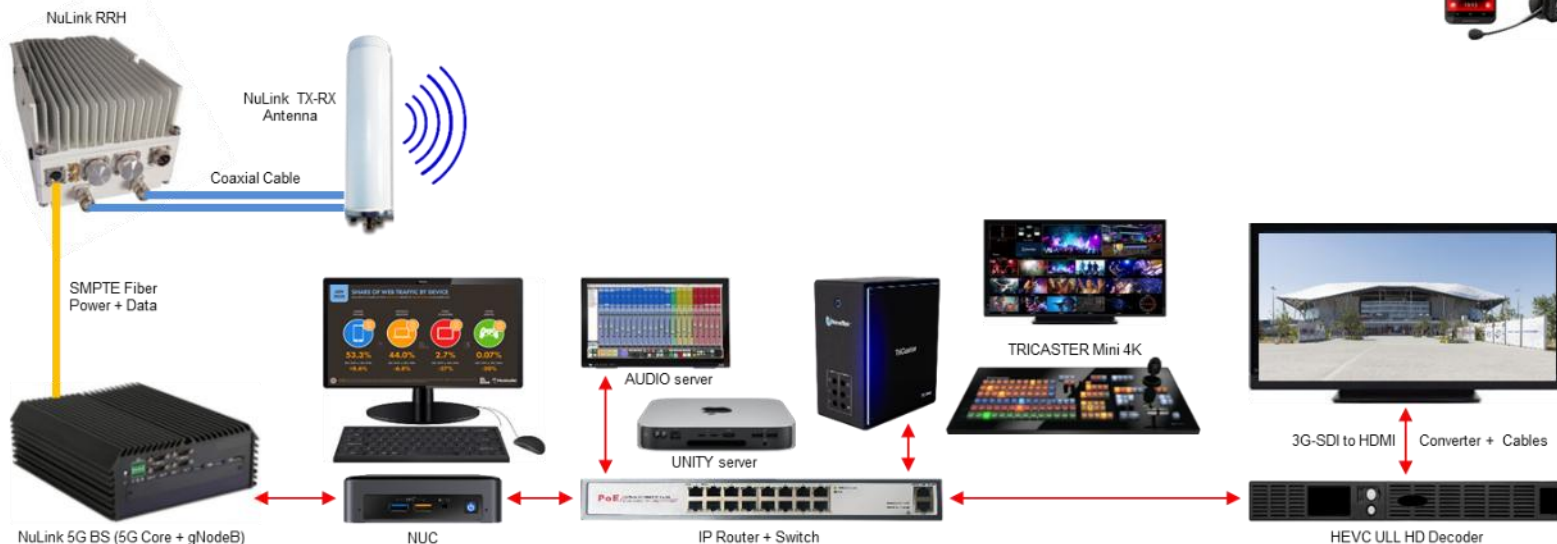
# PRIVATE 5G NETWORK (STAND ALONE VERSION)

PRESENTATION TO IOC – OBS – PARIS-2024 – BROADCASTERS – PRESS AGENCIES



## NuLink Setup

- ✓ 1x BS (5G Core + gNodeB + RRH + antenna)
- ✓ 1x GRASS VALLEY HD camera (HEVC ULL)
- ✓ 1x PANASONIC HD PTZ camera (NDI-HX)
- ✓ 1x NIKON still camera
- ✓ 1x REPORTER audio set
- ✓ 1x LOUDSPEAKER audio set
- ✓ 3x OPPO smartphone (UNITY intercom)
- ✓ 1x TRICASTER Mini 4K + Keyboard + Monitor
- ✓ 1x NUC + keyboard + monitor + 1x Apple Mini PC (UNITY server)
- ✓ 1x HEVC ULL HD decoder + TV Monitor (OE)





## **PRIVATE 5G NETWORK (STAND ALONE VERSION)**

**PRESENTATION TO IOC – OBS – PARIS-2024 – BROADCASTERS – PRESS AGENCIES**

**DEMONSTRATION POWERED  
BY NULINK EQUIPMENT**



## ► PROOF OF CONCEPT

### CASE STUDY

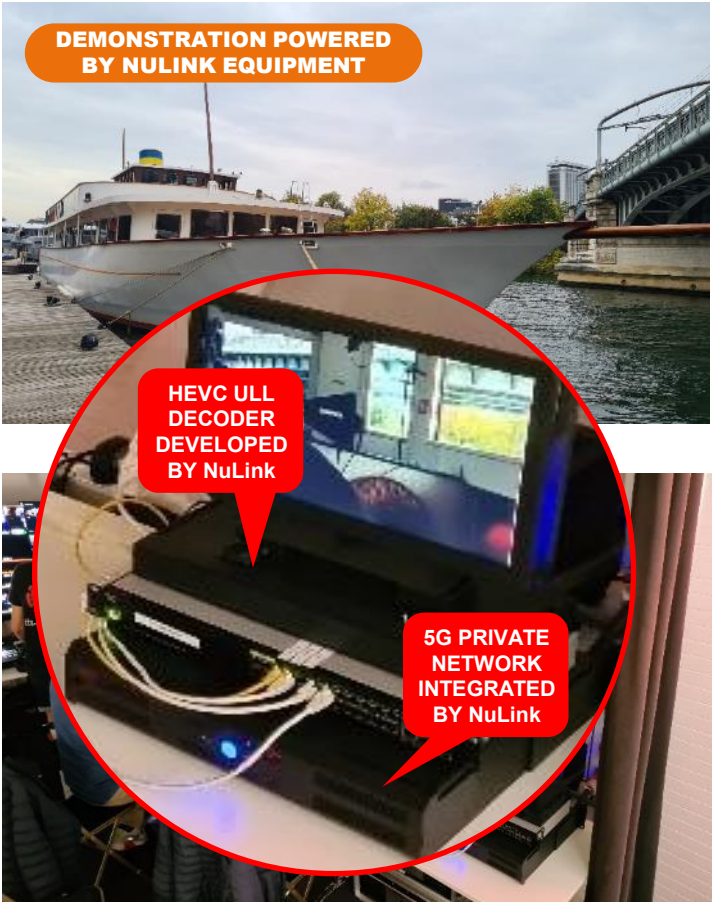
**PRESS CONFERENCE BY  
CHRISTEL HEYDEMANN  
CEO OF ORANGE  
PARIS – LA SEINE  
11 October 2022**



**NuLink SUPPLIED TO ORANGE EVENTS  
A PRIVATE 5G NETWORK FOR THIS PRESS  
CONFERENCE PRESENTING THE IMPLICATION OF  
ORANGE AS UNIQUE SUPPLIER OF THE WHOLE  
TELECOM / CONNECTIVITY INFRASTRUCTURE  
(INCLUDING PRIVATE 5G NETWORK) TO BE  
DEPLOYED ON PARIS-2024 OLYMPIC VENUES**



**PRIVATE 5G NETWORK (STAND ALONE VERSION)**  
**PRESS CONFERENCE BY CHRISTEL HEYDEMANN / CEO OF ORANGE**





## ► PROOF OF CONCEPT

### WPM PARIS-2024

PARIS-2024 OLYMPICS  
ORANGE EVENTS  
ARCHIVES BUILDING  
17-18 October 2022

**NuLink DEPLOYED THIS PoC FOR ORANGE EVENTS TO PRESENT AT THE WORLD PRESS MEETING ORGANISED BY P2024, HOW A PRIVATE 5G NETWORK DEPLOYED ON OLYMPIC VENUES CAN OFFER A RELIABLE AND FAST TRANSFER OF PHOTOS TO THE SERVERS OF NEWS AGENCIES**



## **PRIVATE 5G NETWORK (STAND ALONE VERSION)**

**WPM – PRESENTATION TO PRESS AGENCIES**



## ► PROOF OF CONCEPT

### SSR-SRG SHOWROOM 2022

SFR ZÜRICH  
6–7 December 2022

**SRG SSR**

**AT THE REQUEST OF SSR-SRG, NULINK  
PRESENTED ITS 5G PROTOTYPES TO ALL  
SSR-SRG RADIO-TV CHANNELS DURING  
A SHOWROOM ORGANISED BY SRF**





## ► 5G DEMO TRAILER

# PRIVATE 5G NETWORK IN A TRAILER

July 2023

**TO SUPPORT ITS DEMONSTRATIONS  
TO POTENTIAL CUSTOMERS, NuLink HAS  
DEVELOPED A 5G MOBILE PRODUCTION  
UNIT INTEGRATED INTO A TRAILER.**



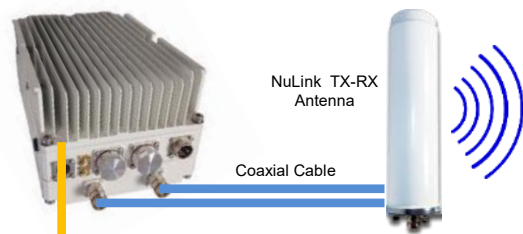
# PRIVATE 5G NETWORK IN A TRAILER

## 5G STUDIO WITH LIVE STREAMING OVER STARLINK CAPABILITY

### Setup

- ✓ TDD channel in band 40
- ✓ Full duplex connectivity
- ✓ Intercom with smartphones
- ✓ AV Return channel
- ✓ TX power at 500 mW
- ✓ Coverage 300 meters around Base Station
- ✓ Streaming over STARLINK or Fiber

NuLink 5G Radio Head



Coaxial Cable

NuLink 5G Base Station



NuLink TX-RX  
Antenna

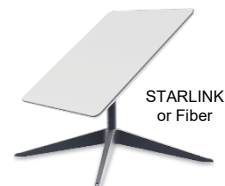
Coaxial Cable



TRICASTER Mini 4K

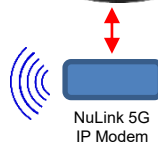


LIVE Streaming

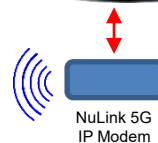


STARLINK  
or Fiber

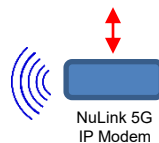
PANASONIC  
AW-HE40 with NDI|HX  
Connected to a NuLink  
LTE IP Modem



PANASONIC  
AW-HE100 with NDI|HX  
Connected to a NuLink  
LTE IP Modem



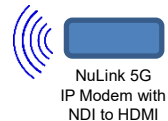
PANASONIC  
CX350 with NDI|HX  
Connected to a NuLink  
LTE IP Modem



PANASONIC  
CX350 with NDI|HX  
Connected to a NuLink  
LTE IP Modem



NuLink 5G IP Intercom System



NuLink 5G  
IP Modem with  
NDI to HDMI



Studio AV Return Channel



► **PROOF OF CONCEPT**  
**CISCO INNOVATIVE 5G BASED EVENT DELIVERY**  
**IBC-2023**

**EXHIBITION**  
**IBC-2023**

**AMSTERDAM RAI**  
**15-18 September 2023**



**FOLLOWING ON FROM IBC ACCELERATOR 2022, NuLink, IN PARTNERSHIP WITH CISCO AND ITS EQUIPMENT SUPPLIERS (GRASS VALLEY, PANASONIC AND NIKON), PRESENTED ITS 5G MOBILE PRODUCTION UNIT INTEGRATED INTO A TRAILER.**

**ALL THE DEVICES CONNECTED TO THE 5G PRIVATE NETWORK DEPLOYED BY THE TRAILER WERE OPERATED IN REMOTE PRODUCTION FROM THE CISCO BOOTH.**



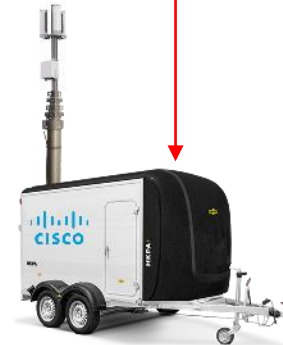


# ► PROOF OF CONCEPT CISCO INNOVATIVE 5G BASED EVENT DELIVERY IBC-2023



1x NEWTEK  
TRICASTER  
PRODUCTION UNIT  
(NDI-HX)

IP Connection



## ► PROOF OF CONCEPT

### BLUE LIGHTS

**BABS – MSK PROJECT  
LIVE DEMO  
25 October 2023**

**NuLink DEPLOYED THIS PoC FOR SPECIALISTS  
IN CRISIS COMMUNICATION.**

**LIVE TRANSMISSION VIA 4G/5G TELECOM  
PUBLIC NETWORKS AND 5G PRIVATE  
NETWORKS FROM POLICE CAR, POLICEMEN,  
AMBULANCE AND FIREFIGHTERS WERE  
DEMONSTRATED**

**DDPS-BABS / PROJET CMS-MSK**  
**PRESENTATION OF THE RESULTS OF THE NPR  
PROJECT OF THE CANTON OF NEUCHÂTEL**



## DDPS-BABS / CMS-MSK PROJECT

### PRESENTATION OF THE RESULTS OF THE NPR PROJECT OF THE CANTON OF NEUCHÂTEL

#### 5G TACTICAL BUBBLE PROJECT

"Deployment of a 5G tactical communication bubble as part of the first aid of the canton of Neuchâtel"



Presentation of audio-véo-photo-data-Intercom solutions



Presentation of prototypes



Presentation of PRIVATE 5G NETWORKS



Demonstration directed by Steve Christin



Presentation of integration in police car



Networking



## CANTONAL 4G/5G TACTICAL BUBBLE

### CONNECTION VIA PUBLIC TELECOMMUNICATIONS NETWORKS

PONE DEMO  
IN COLLABORATION  
WITH

**police**  
NEUCHÂTELOISE



ALL COMMUNICATIONS FROM  
THIS DEMONSTRATION PASSES  
VIA PUBLIC TELECOMMUNICATIONS  
NETWORKS

Police car N°1 :

1x SIM SUNRISE  
1x SIM SWISSCOM

Ambulance :

1x SIM SUNRISE  
1x SIM SWISSCOM

Police drone :

1x SIM SUNRISE  
1x SIM SWISSCOM

Smartphone Policemen N° 1/2

1x SIM SUNRISE



VOITURE DE POLICE N°1  
4 IMAGES TRANSMISES  
DE CAMERAS FIXES



PATROUILLEUR N°1  
1 IMAGE TRANSMISE  
DE SON SMARTPHONE



LANCEUR D'ALERTE  
1 IMAGE TRANSMISE  
DE SON SMARTPHONE



PATROUILLEUR N°2  
1 IMAGE TRANSMISE  
DE SON SMARTPHONE

## LOCAL 5G TACTICAL BUBBLE CONNECTION VIA PRIVATE 5G NETWORK



DEMONSTRATION ON  
THE STADIUM FORECOURT  
IN COLLABORATION  
WITH



ALL COMMUNICATIONS FROM  
THIS DEMONSTRATION PASSES  
VIA THE LOCAL PRIVATE 5G NETWORK

### Command Unit Setup

The 5G private network is composed of the following equipment:

- 1x 5G core network
- 1x radio band n40 (2300 MHz – 2400 MHz)
- 1x 6 meters mast
- 1x TX-RX antenna band n40
- 1x STARLINK system

Main parameters:

- Up to 100 MHz channel
- 80% upload / 20% download
- 1W in TX

Easily integrated into any type of command vehicle

## LOCAL 5G TACTICAL BUBBLE CONNECTION VIA PRIVATE 5G NETWORK



### Intervention Manager

- ⇒ Images transmitted to the engagement centre by the camera installed on his helmet.  
The 5G modem is attached to the headset (prototype with more TX power than a smartphone).
- ⇒ PTT communication on smartphone.
- ⇒ Display allowing the display of images from other firefighters' cameras, drones, a whistleblower, the engagement center, surveillance cameras, a FOTOKITE, or any other source...



## LOCAL 5G TACTICAL BUBBLE CONNECTION VIA PRIVATE 5G NETWORK



### Fire Brigade

- ⇒ PTT communication on smartphone.  
The camera of the same smartphone  
transmits images to the engagement  
center.  
These images can then be sent back  
to one or more recipients.

## ► PROOF OF CONCEPT

### SSR-SRG

Workshop at RTS GENEVA  
6 March 2025

**SRG SSR**

**FOR THIS WORKSHOP, NuLink DEPLOYED ITS PRIVATE 5G NETWORK AT RTS TO SHOWCASE HOW THIS NEW SOLUTION COULD REVOLUTIONISE LIVE BROADCASTING, REDUCING COST AND DEPLOYMENT TIME.**

**NuLink ALSO PRESENTED THE PRIVATE 5G NETWORKS DEPLOYED ON PARIS-2024 OLYMPIC OPENING CEREMONY AND VENUES.**



# SSR-SRG / PRIVATE 5G NETWORK WORKSHOP AT RTS GENEVA

## PRESENTATION OF EQUIPMENT FOR LIVE PRODUCTION USE CASES



PARIS-2024 Olympics use cases



Presentation of audio-vidéo 5G Equipment



Networking



Presentation of 5G Production Room



## ▶ PROOF OF CONCEPT

### AMPVISUALTV

24H Le Mans  
12-15 June 2025

**AMPVISUALTV DEPLOYED AT THIS EVENT  
A NuLink PRIVATE 5G NETWORK TO  
EVALUATE IF SUCH SOLUTION COULD  
HELP THE PRODUCTION OF MASSIVE LIVE  
CONTENT NEEDED TO BROADCAST  
THE RACE.**



## 24H LE MANS / EVALUATION OF PRIVATE 5G NETWORK SOLUTION TEST OF EQUIPMENT FOR LIVE CONTENT CREATION



**PRIVATE 5G NETWORK installed on crane**



**Test of PANASONIC NDI camera**



**TEST of HAIVISION Pro-460**



**Test of SAMSUNG S24 + MoJoPro app**



**Global Production Room**



**5G Control Room**

## ► PROOF OF CONCEPT

# ORANGE EVENTS REPORTAGES

Tour de France 2025  
1-13 July 2025

**ORANGE EVENTS REPORTAGES DEPLOYED  
AT THIS EVENT A NuLink PRIVATE 5G  
NETWORK TO EVALUATE IF SUCH  
SOLUTION COULD HELP THE PRODUCTION  
OF MASSIVE LIVE CONTENT NEEDED TO  
BROADCAST THE STAGES.**





## TOUR DE FRANCE 2025 / EVALUATION OF PRIVATE 5G NETWORK SOLUTION

### TEST OF EQUIPMENT AND COVERAGE FOR LIVE CONTENT CREATION



**PRIVATE 5G NETWORK** installed on crane



**PRIVATE 5G NETWORK** installed on tripod  
to cover the Team Bus area



**5G PTZ camera** shooting FRANCE TV VELO CLUB studio



## **TOUR DE FRANCE 2025 / EVALUATION OF PRIVATE 5G NETWORK SOLUTION**

### **TEST OF EQUIPMENT AND COVERAGE FOR LIVE CONTENT CREATION**



**5G replaces UHF audio transmission**



**Test of 5G Live Studio operated in Remote Production from the Broadcaster's office**

## **TOUR DE FRANCE 2025 / EVALUATION OF PRIVATE 5G NETWORK SOLUTION**

### **TEST OF EQUIPMENT AND COVERAGE FOR LIVE CONTENT CREATION**

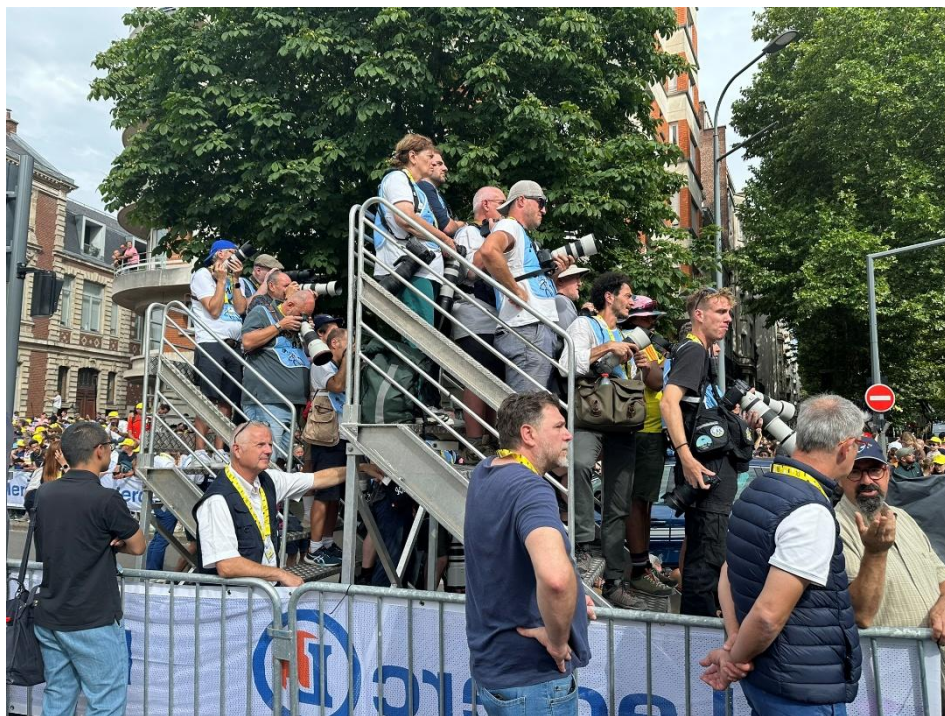


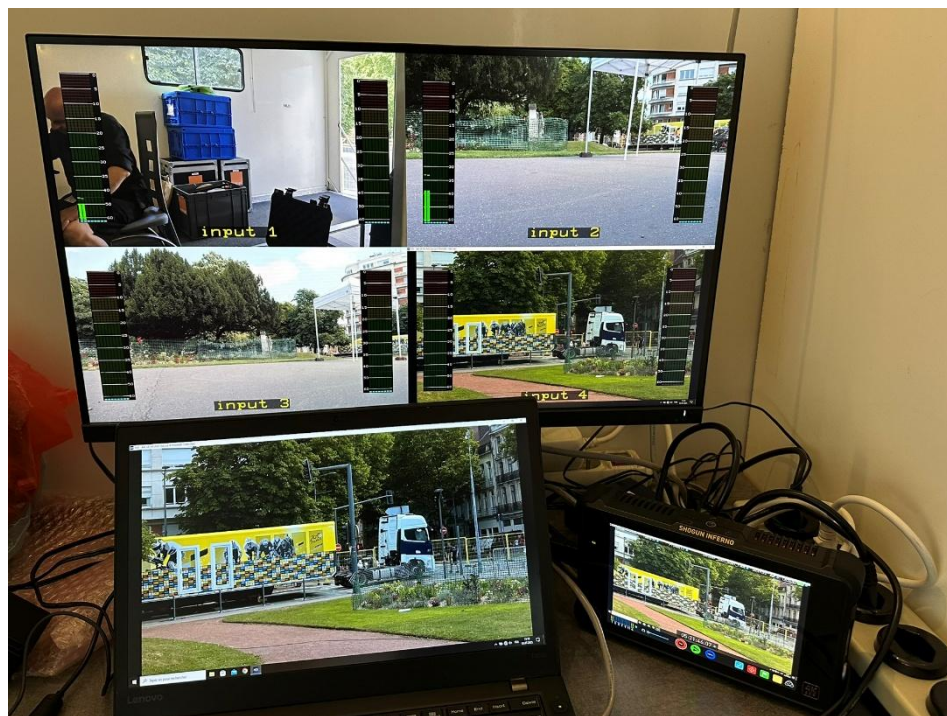
Photo reporter position on the finish line



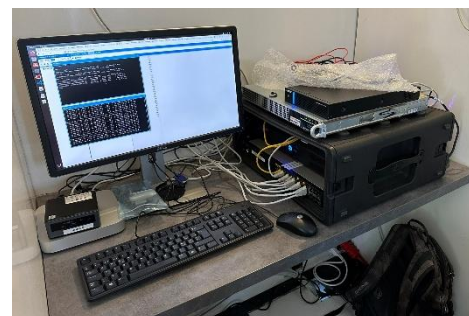
Photo reporter still camera equipped with a 5G modem to upload photos wirelessly from the finish line to the clouds of the press agencies



## TOUR DE FRANCE 2025 / EVALUATION OF PRIVATE 5G NETWORK SOLUTION TEST OF EQUIPMENT AND COVERAGE FOR LIVE CONTENT CREATION



5G Production Room



Portable PRIVATE 5G NETWORK



5G monitoring of connected devices

 **FOR ANY QUESTION, PLEASE CONTACT US**

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