

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**

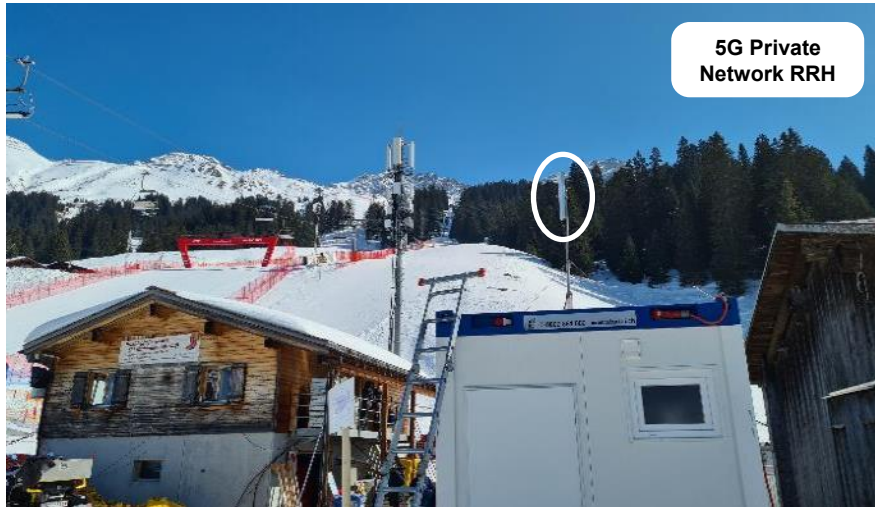


PRIVATE 5G NETWORK (STAND ALONE VERSION)

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



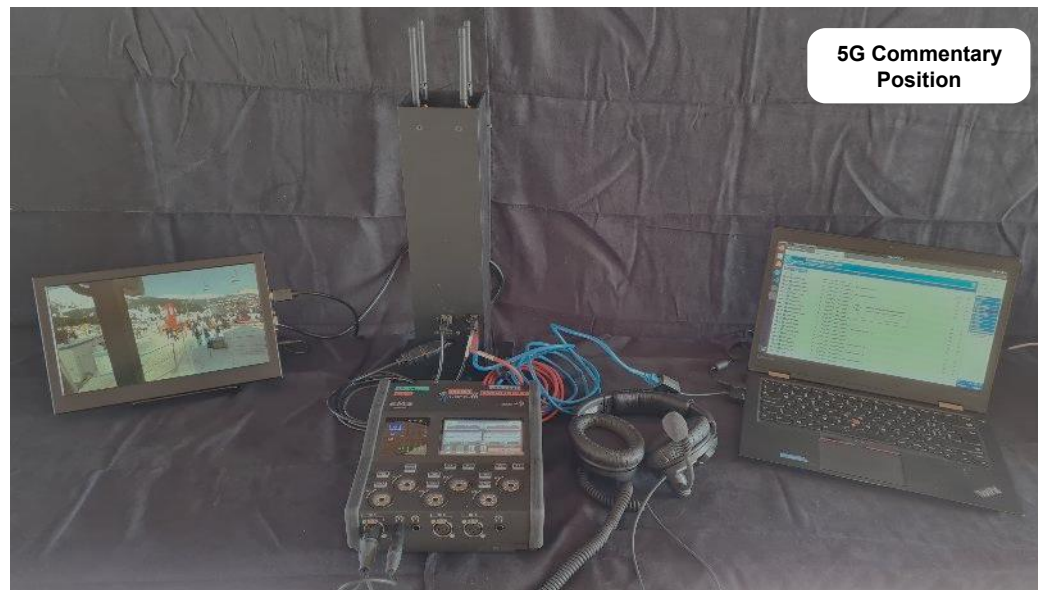
PRIVATE 5G NETWORK (STAND ALONE VERSION)

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



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

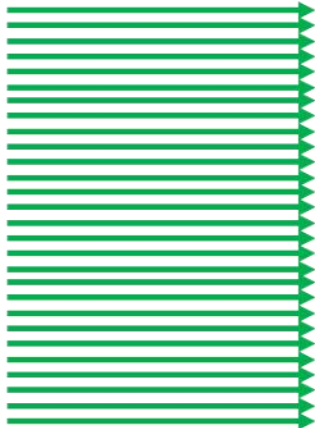
AMSTERDAM RAI
9–12 September 2022

**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

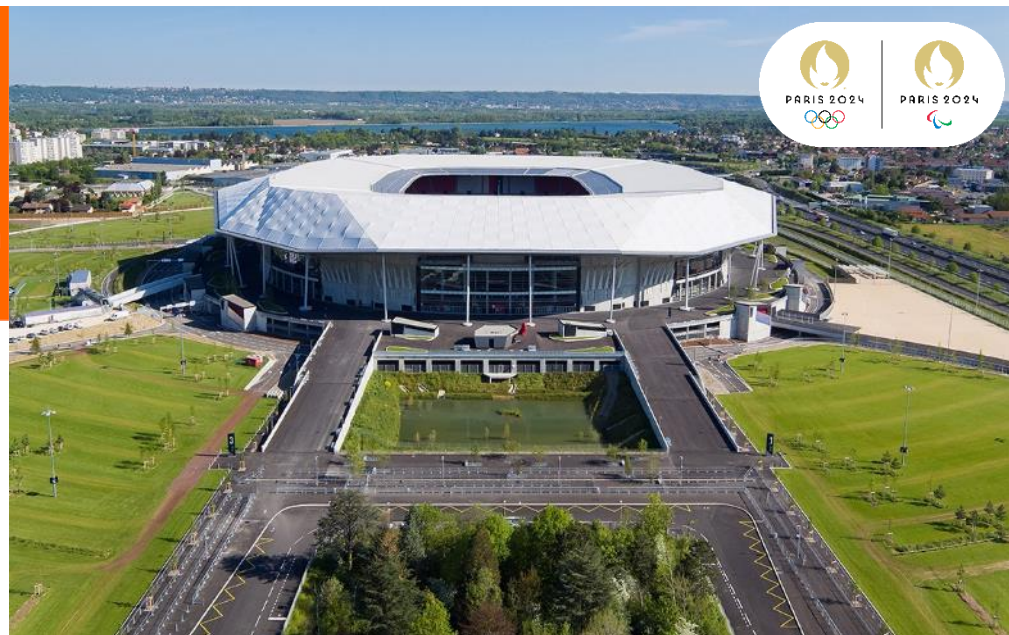
► PROOF OF CONCEPT

CASE STUDY

PARIS-2024 OLYMPICS
LYON GROUPAMA STADIUM
7 October 2022

orangeTM

**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**



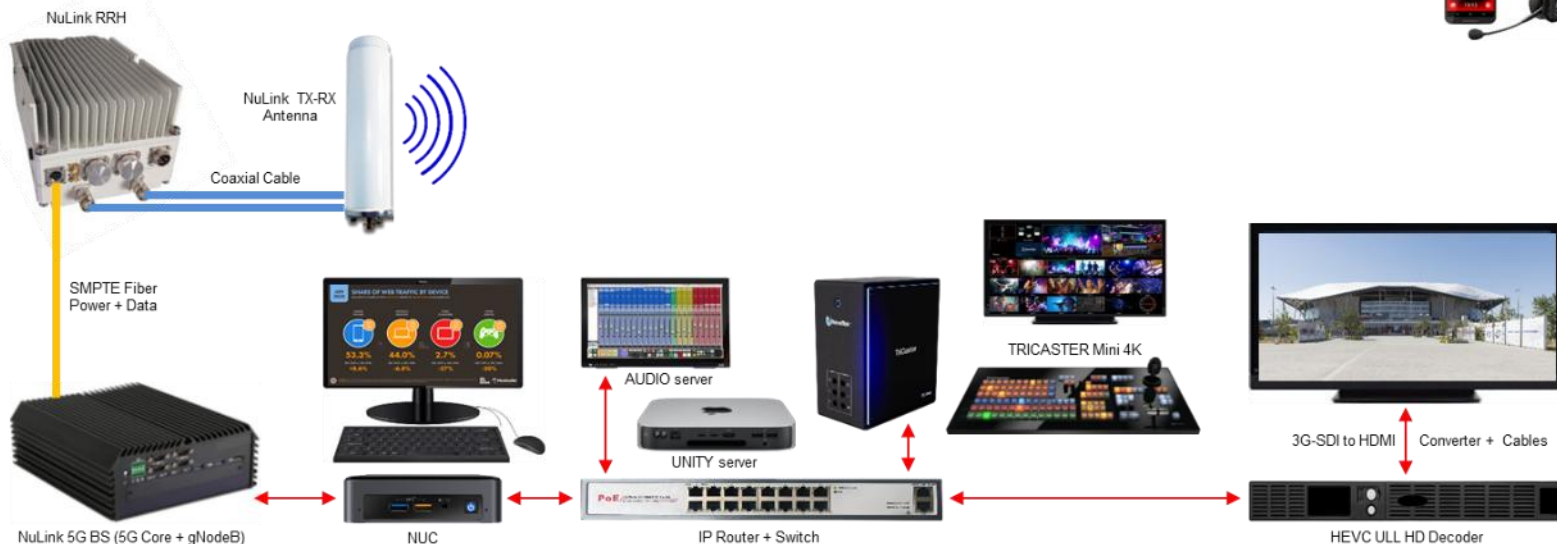
PRIVATE 5G NETWORK (STAND ALONE VERSION)

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.**



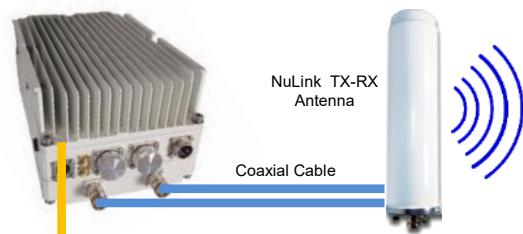
PRIVATE 5G NETWORK IN A TRAILER

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

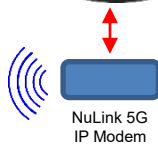


TE Fiber
Power + Data

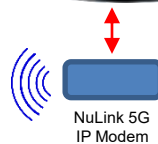
NuLink 5G Base Station



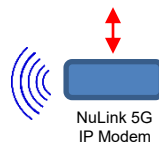
PANASONIC
AW-HE40 with NDI|HX
Connected to a NuLink
LTE IP Modem



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



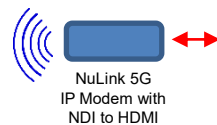
PANASONIC
CX350 with NDI|HX
Connected to a NuLink
LTE IP Modem



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



NuLink 5G IP Intercom System

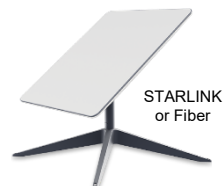


Studio AV Return Channel

TRICASTER Mini 4K



LIVE Streaming



▶ **PROOF OF CONCEPT** **CISCO INNOVATIVE 5G BASED EVENT DELIVERY**



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.

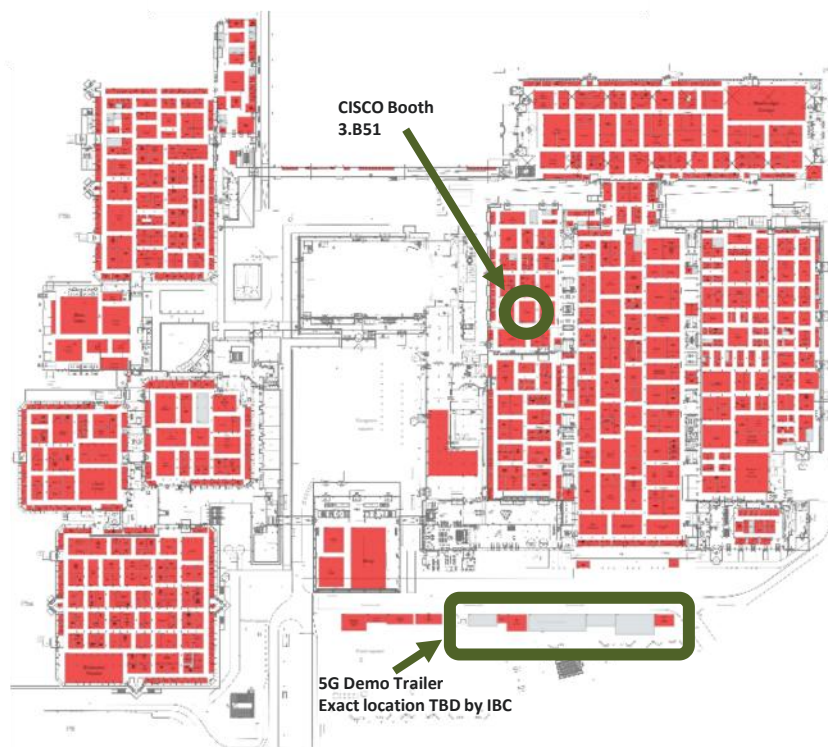
ALL THE DEVICES CONNECTED TO THE 5G PRIVATE NETWORK DEPLOYED BY THE TRAILER WERE OPERATED IN REMOTE PRODUCTION FROM THE CISCO BOOTH.



► PROOF OF CONCEPT

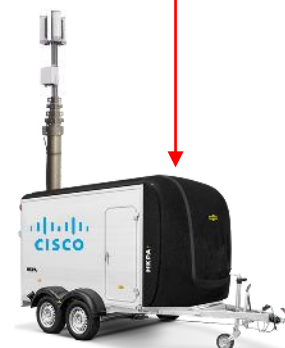
CISCO INNOVATIVE 5G BASED EVENT DELIVERY

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.

PARIS-2024 OLYMPIC AND PARALYMPIC GAMES

March 2020 – October 2024



Laurent ZWAHLEN

Senior Project Manager
Mobile & Radio Infrastructures for Road Events
5G Private Network Deployment
DVTM Opening Ceremony

Direction de la TEC

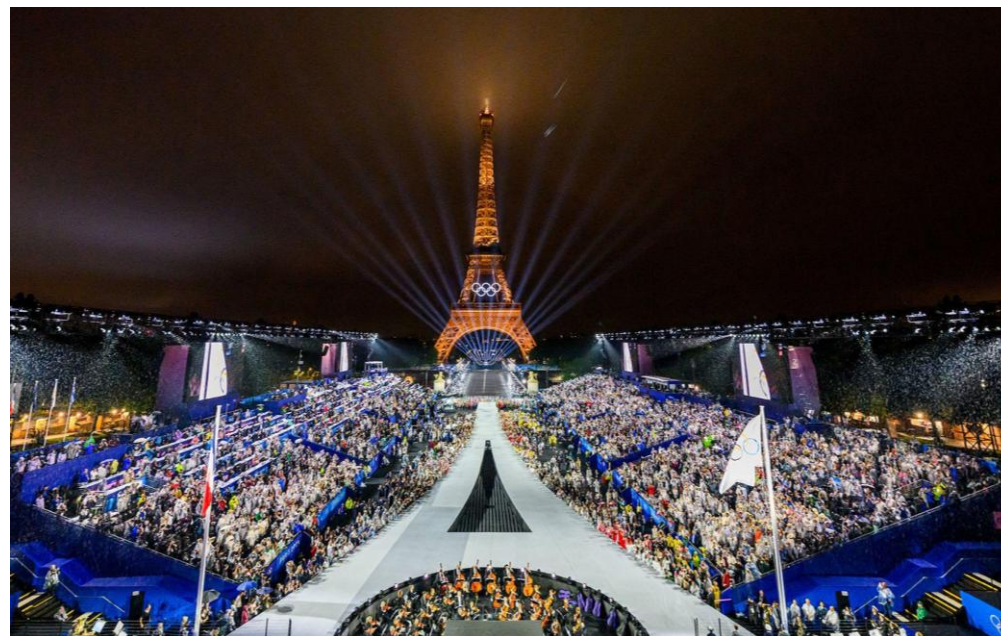
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Comité d'organisation des Jeux Olympiques et
Paralympiques de Paris 2024

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paris2024.org



► PROOF OF CONCEPT

SSR-SRG

Workshop at RTS GENEVA
6 March 2025

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.

SRG SSR



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

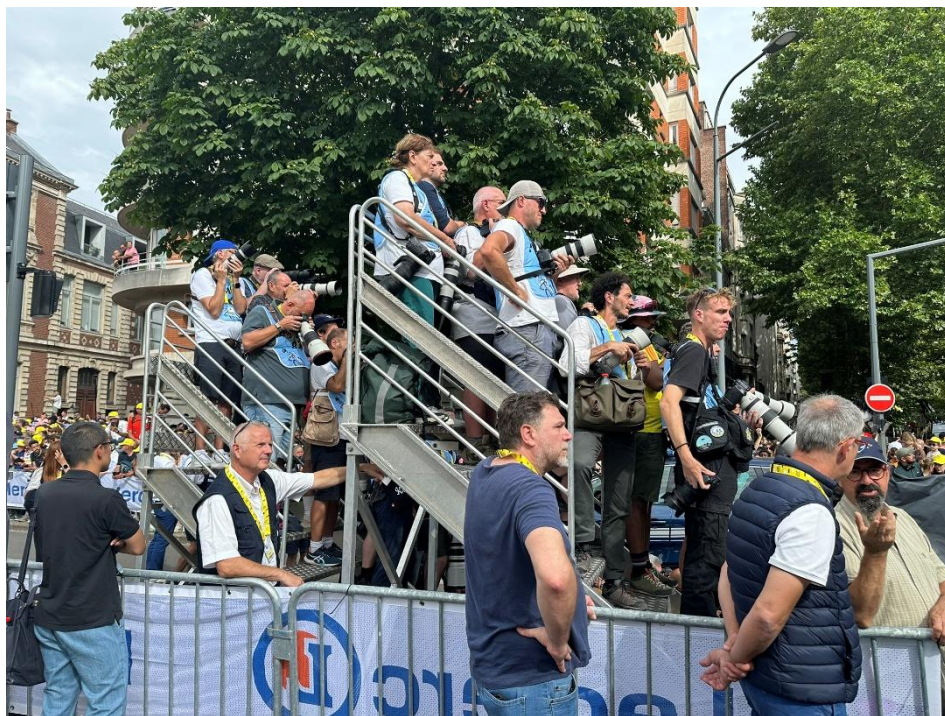
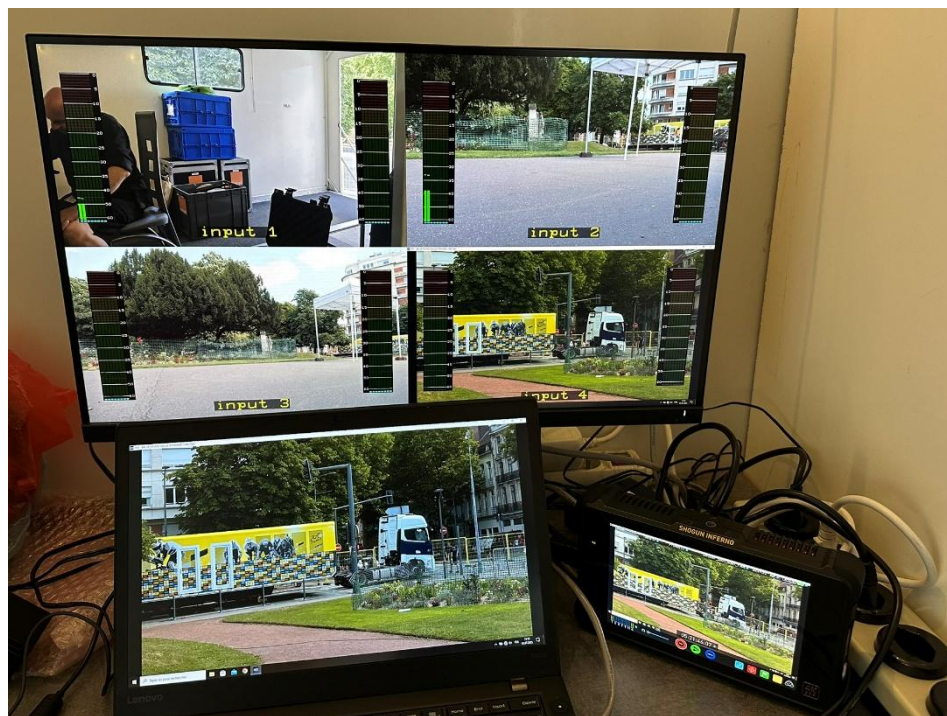


Photo reporter position on the finish line



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

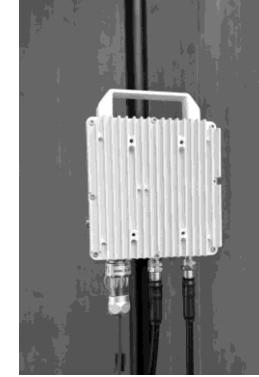
▶ **PROOF OF CONCEPT**
PANASONIC INNOVATIVE 5G/NDI-HX2
STUDIO CAMERA



EXHIBITION
IBC-2023

AMSTERDAM RAI
12-15 September 2025

PANASONIC AND NuLink UNVEILED
AT IBC STATE-OF-THE-ART 5G/NDI-HX2
STUDIO CAMERA.
THIS INTEGRATION PRESENTED A
REVOLUTIONARY CAMERA THAT WILL
TRANSFORM LIVE PRODUCTION
WORKFLOW THANKS TO NDI-HX2
COMPRESSION AND TRANSMISSION
VIA NuLink's INTEGRATED PRIVATE
5G NETWORKS.



▶ LANG BARANDAY ROADSHOW 5G PRODUCTION STUDIO WITH PANASONIC EQUIPMENT



PANASONIC AND NuLink PRESENTED A FULL 5G BASED LIVE PRODUCTION SETUP, INCLUDING 5G CAMERAS, 5G AUDIO, 5G INTERCOM AND 5G RETURN-VIDEO.

**▶ RTL+ GERMANY
PRESENTATION OF 5G EQUIPMENT**

RTL + Panasonic

**KOLN
25–26 November 2025**

**PANASONIC AND NuLink DEMONSTRATED
AT RTL+ GERMANY VARIOUS 5G EQUIPMENT
THAT WILL TRANSFORM LIVE PRODUCTION
WORKFLOW THANKS TO NDI-HX2 COMPRESSION
AND TRANSMISSION VIA NuLink's INTEGRATED
PRIVATE 5G NETWORK.**



 **FOR ANY QUESTION, PLEASE CONTACT US**

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