# ZYRO

# LONG-RANGE VIDEO TRANSMISSION

## 5.8 GHz FIELD VALIDATION REPORT




| | |
|---|---|
| **Document version** | **V2.0 - Customer Edition** |
| **Test date** | 21 July 2026 |
| **Firmware** | fw-20260717-4uu8.bin |
| **Prepared for** | Customer technical evaluation |

00

# DOCUMENT CONTROL

Status, scope and source basis

| Document item | Details |
|---|---|
| **Document title** | ZYRO 5.8 GHz Long-Range Video Transmission Field Validation Report |
| **Document ID** | ZYRO-TR-5G8-20260721-V2.0 |
| **Version** | V2.0 - Customer Edition |
| **Test date** | 21 July 2026 |
| **Source basis** | Original three-page field test record plus two runtime screenshots supplied with this report |
| **Product designation** | 5.8 GHz wireless video transmission system; specific commercial model not stated in the source record |

## Executive summary

| MAXIMUM TESTED DISTANCE | DIRECTIONAL ANTENNA | OMNI ANTENNA | OBSERVED LIMITATION |
|---|---|---|---|
| **9.78 km** | **512 / 1024 kbps** | **512 kbps** | **1024 kbps** |
| Open-path field test | Smooth at both rates | Smooth at 9.78 km | Minor stuttering with omni |

The supplied field record documents successful video transmission at 3.86 km and 9.78 km. At 9.78 km, the directional-antenna configuration was reported smooth at both 512 kbps and 1024 kbps. The omni-antenna configuration was reported smooth at 512 kbps and showed minor stuttering at 1024 kbps.

Data integrity note: This customer edition reorganizes and explains the supplied evidence. It does not replace missing continuous RF logs, packet-loss records, weather data, GPS coordinates or calibrated antenna-gain measurements.

## Contents


- 01 Test objective and scope
- 02 System under test
- 03 Test configuration
- 04 Test routes and environment
- 05 Test 1 - 3.86 km
- 06 Test 2 - 9.78 km
- 07 Runtime evidence
- 08 Engineering interpretation
- 09 Conclusion and recommendations
- Appendix A Referenced media
- Appendix B Original source report

# 01 TEST OBJECTIVE AND SCOPE

What was evaluated and what was not recorded

## Objective

Evaluate the practical long-range video transmission performance of the supplied 5.8 GHz wireless link at two field distances and compare directional and omni antenna behavior at the longer route.

## Evaluation points

- Link establishment and end-to-end video availability at 3.86 km and 9.78 km.
- Observed video smoothness under the tested antenna and bitrate combinations.
- Instantaneous runtime indicators captured from the device web interface.
- Suitability of directional versus omni antennas for the tested long-range use case.

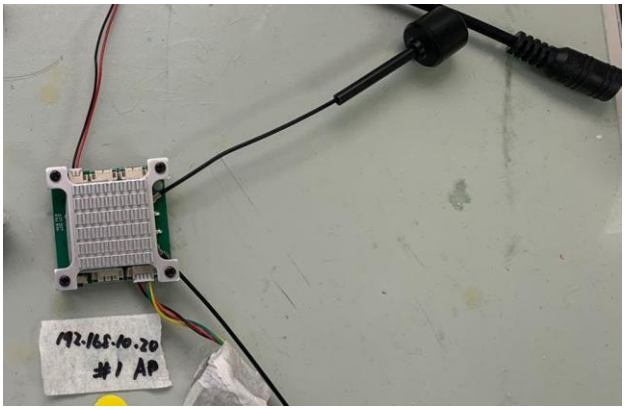
## Scope boundaries

| Scope item | Report treatment |
|---|---|
| **Recorded in source** | Test date, firmware, main radio settings, endpoint locations, installation height, route distance, antenna type, selected video bitrates and qualitative video result. |
| **Not recorded** | Weather, wind, humidity, exact GPS coordinates, antenna gain, cable loss, EIRP verification, continuous RSSI/SNR logs, packet-loss percentage, throughput benchmark and Fresnel-zone survey. |
| **Interpretation rule** | Engineering comments in Section 08 are identified as interpretation and are kept separate from the source-derived test results. |

Path condition: The photographs and maps show open outdoor paths. A formal line-of-sight and Fresnel-clearance survey was not included in the source package; therefore this report uses the term “open-path field test” rather than claiming verified Fresnel clearance.

# 02 SYSTEM UNDER TEST

AP, STA, camera and antenna arrangement




AP-side module and antenna connections



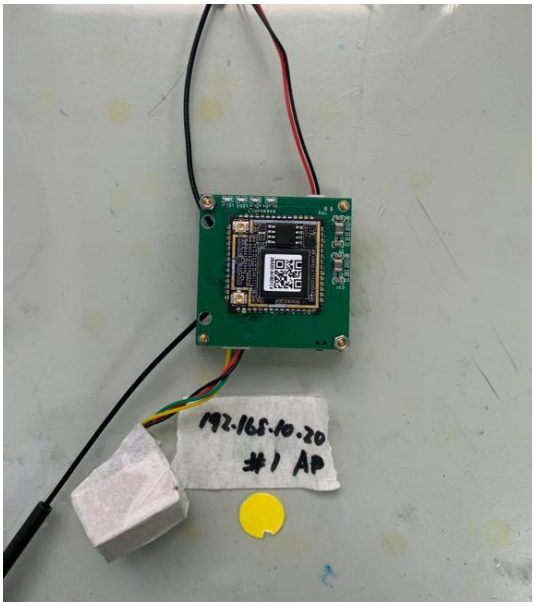

STA-side module, camera and omni antennas

| Element | Source-supported description |
|---|---|
| **AP side** | Wireless module configured as AP. The source photos show both omni and directional antenna options. |
| **STA side** | Wireless module configured as STA and connected to a camera. The source photos show dual omni antennas. |
| **Video interface evidence** | The supplied runtime screenshots show an ONVIF/ODM interface reporting H.264 at 1920 × 1080. |
| **Antenna comparison** | The 9.78 km route compares a directional antenna with an omni antenna under 512 kbps and 1024 kbps video settings. |

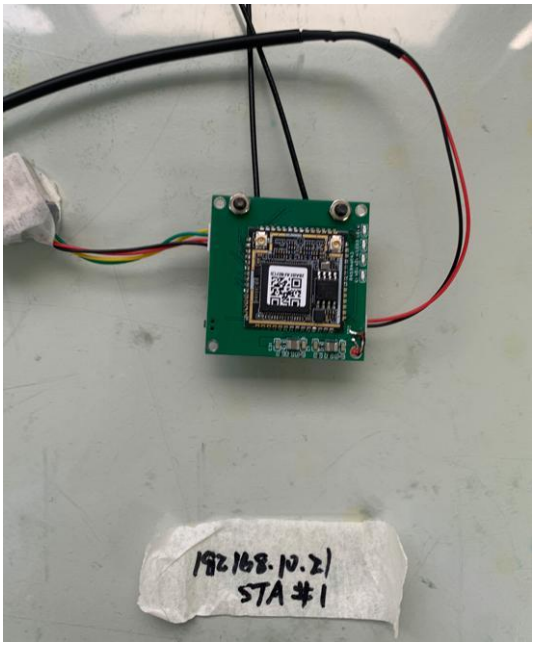
The specific camera model, antenna gain, cable type and commercial product model are not stated in the source report.

# 03 TEST CONFIGURATION

Radio and firmware settings recorded in the source




**AP radio module**




**STA radio module**

| Parameter | Recorded value |
|---|---|
| **Firmware** | fw-20260717-4uu8.bin |
| **SSID shown in configuration screen** | ZMESH_LINK |
| **Operating band** | 5.8 GHz |
| **Channel setting** | 36 |
| **Bandwidth** | 20 MHz |
| **MCS** | MCS0 |
| **Power setting** | 31.5 dBm / 3150 mBm - “Use professional antenna” shown in the UI |
| **Baud rate** | 115200 |

# 03A CONFIGURATION INTERFACE

Original configuration screen retained as source evidence




Figure 3-1. Configuration interface captured in the original source report

Terminology note: The source interface labels the value “36” under Frequency and “5.8G” under Channel. For technical readability, this report presents them as channel 36 and the 5.8 GHz operating band.

# 04 TEST ROUTES AND ENVIRONMENT

Field locations documented in the source report




Route 1: Shuiyue Bridge to Tiande Temple - 3.86 km




Route 2: Nanliao Fishing Port to Potou Fishing Port - 9.78 km

| Route item | Recorded information |
|---|---|
| **Route 1** | AP at Shuiyue Bridge (水月橋); STA at Tiande Temple (天德堂); distance 3.86 km. |
| **Route 2** | AP at Nanliao Fishing Port (南寮漁港); STA at Potou Fishing Port (坡頭漁港); distance 9.78 km. |
| **Terrain evidence** | Route 1 combines a low-elevation bridge site with a higher temple site. Route 2 follows an open coastal path. |
| **Environmental records** | Weather, wind, humidity and spectrum occupancy were not recorded in the supplied report. |

05

# TEST 1 - 3.86 KM

AP at Shuiyue Bridge; STA at Tiande Temple



**AP installation at Shuiyue Bridge**



**STA installation at Tiande Temple**

| DISTANCE | AP INSTALLATION | STA INSTALLATION | OBSERVED RESULT |
|---|---|---|---|
| **3.86 km** | **~1.5 m** | **~1.5 m** | **Smooth** |
| Map measurement in source | Site elevation ~8 m | Site elevation ~85 m | Video reported fluent |

| Test item | Recorded value |
|---|---|
| **AP antenna** | Directional antenna |
| **STA antenna** | Omni antenna |
| **Video bitrate** | Not stated in the source result section |
| **Video result** | 影像流暢 / smooth video |
| **Referenced evidence video** | Video_260721155939T TX 天德堂&RX 水月橋上.mp4 |

Result statement: The source report records smooth video for this 3.86 km setup. No continuous latency, RSSI, SNR or packet-loss statistics were included for this route.

06

# TEST 2 - 9.78 KM

Directional versus omni antenna comparison



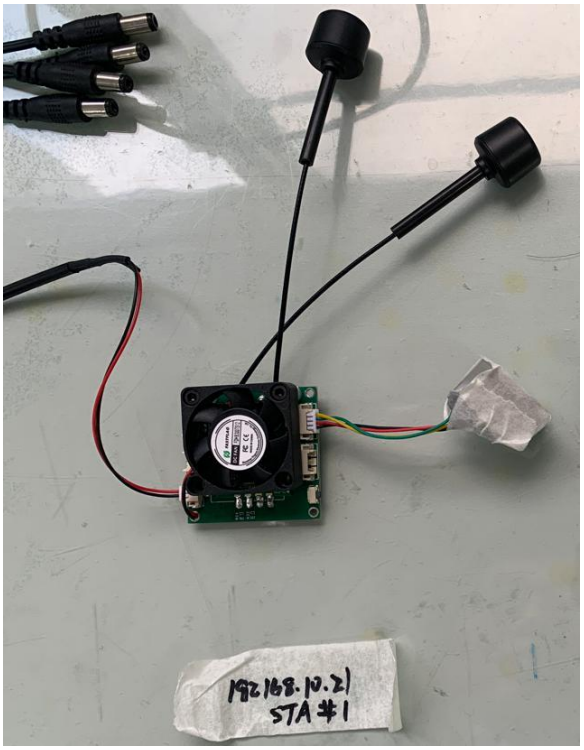
AP installation at Nanliao Fishing Port




STA installation at Potou Fishing Port



Directional antenna used for the long-range comparison




Omni antenna arrangement shown in the source setup

| DISTANCE | DIRECTIONAL / 512 | DIRECTIONAL / 1024 | OMNI / 1024 |
|---|---|---|---|
| 9.78 km | Smooth | Smooth | Minor stutter |
| Coastal open-path route | Source-reported result | Source-reported result | Source-reported result |

# 06A RESULT MATRIX

All test outcomes consolidated from the source record

| Test route | Distance | Antenna configuration | Video bitrate | Observed result |
|---|---|---|---|---|
| Shuiyue Bridge → Tiande Temple | 3.86 km | AP directional / STA omni | Not stated in source report | Smooth video |
| Nanliao Fishing Port → Potou Fishing Port | 9.78 km | Directional antenna | 512 kbps | Smooth video |
| Nanliao Fishing Port → Potou Fishing Port | 9.78 km | Directional antenna | 1024 kbps | Smooth video |
| Nanliao Fishing Port → Potou Fishing Port | 9.78 km | Omni antenna | 512 kbps | Smooth video |
| Nanliao Fishing Port → Potou Fishing Port | 9.78 km | Omni antenna | 1024 kbps | Minor stuttering |

## Long-route comparison

| Comparison item | Result |
|---|---|
| **Directional antenna** | Both 512 kbps and 1024 kbps were reported smooth at 9.78 km. |
| **Omni antenna** | 512 kbps was reported smooth; 1024 kbps showed minor stuttering. |
| **Referenced directional video** | Video_260721162958 指向天線 TX 坡頭&RX 南寮.mp4 |
| **Referenced omni video** | Video_260721164457 圓頭 ANTTX 坡頭&RX 南寮.mp4 |

No quantitative acceptance threshold was supplied. Accordingly, this report presents the observations without assigning a formal pass/fail certification.

# 07 RUNTIME EVIDENCE

Instantaneous device status and ping captures

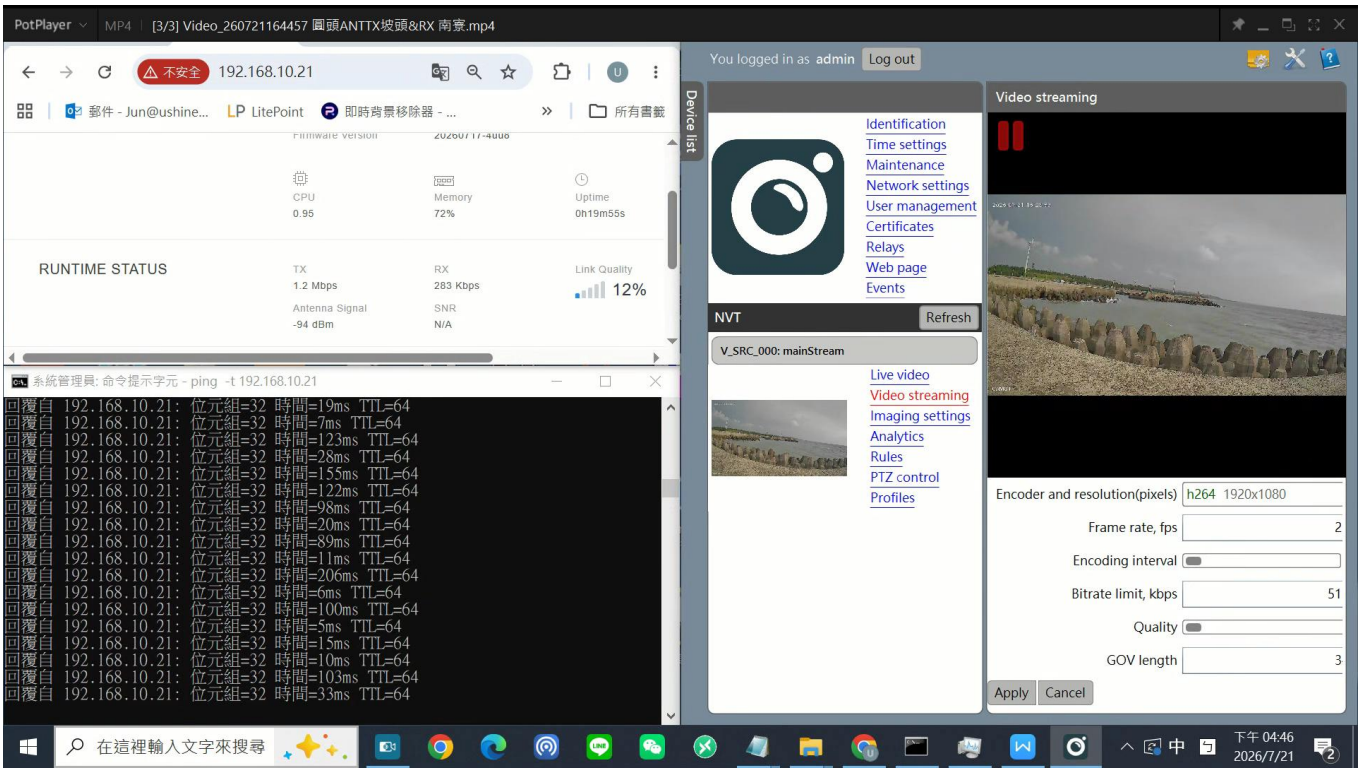



Figure 7-1. Runtime screenshot A supplied with the test package

| Visible indicator | Captured value |
|---|---|
| **Visible video reference** | The media-player title includes the 9.78 km omni-antenna test video filename. |
| **Displayed device address** | 192.168.10.21 |
| **Runtime TX / RX** | 1.2 Mbps / 283 Kbps |
| **Antenna signal** | -94 dBm |
| **Link quality** | 12% |
| **SNR** | N/A |
| **Visible ping samples** | Approximately 5 ms to 206 ms in the captured window; no timeout is visible in the screenshot. |

The values above are instantaneous UI readings, not a continuous measurement log. TX/RX counters are presented from the perspective of the displayed device and should not be treated as an application-layer throughput benchmark without confirming device role and counter definition.

# 07A

# RUNTIME EVIDENCE - SECOND CAPTURE

Higher signal and SNR state shown in the supplied evidence

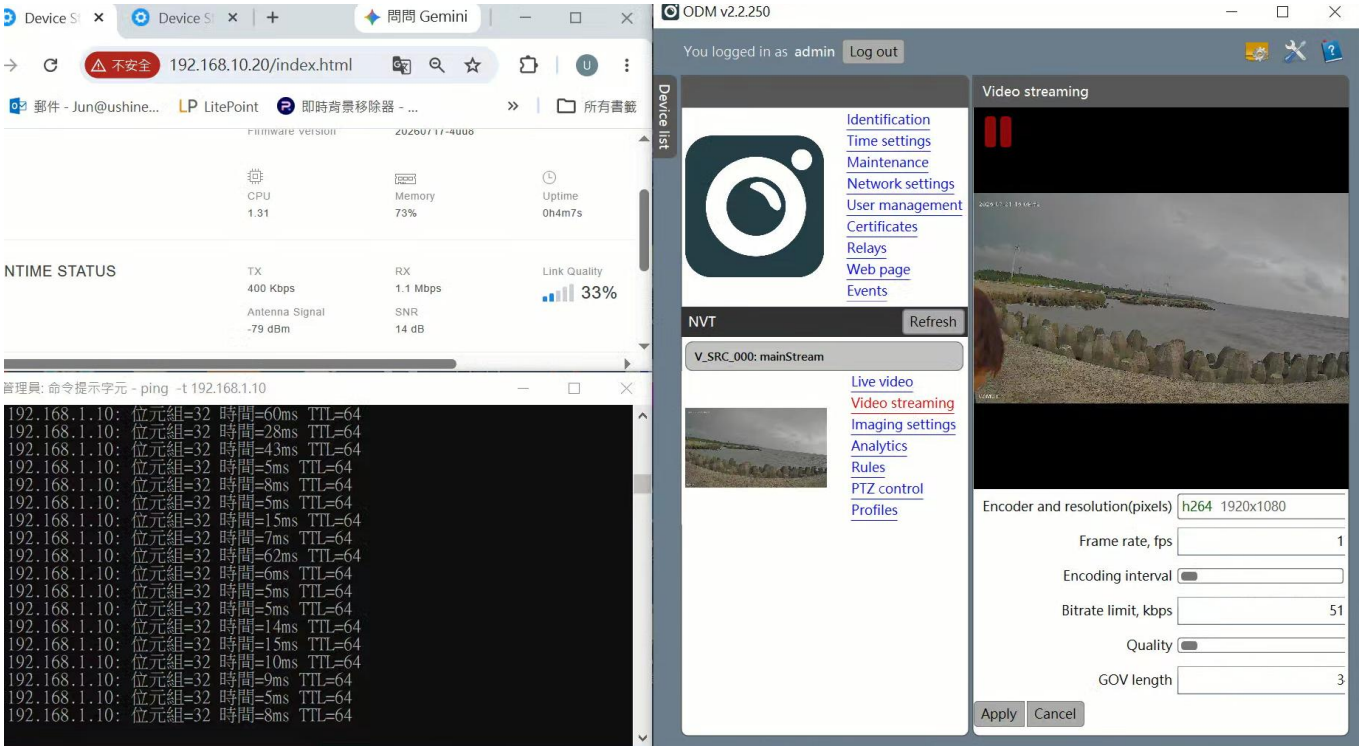



Figure 7-2. Runtime screenshot B supplied with the test package

| Visible indicator | Captured value |
|---|---|
| **Displayed device address** | 192.168.10.20 |
| **Runtime TX / RX** | 400 Kbps / 1.1 Mbps |
| **Antenna signal** | -79 dBm |
| **Link quality** | 33% |
| **SNR** | 14 dB |
| **Visible ping samples** | Approximately 5 ms to 60 ms in the captured window; no timeout is visible in the screenshot. |
| **Video interface** | H.264, 1920 × 1080 shown in the ODM interface |

Compared with Figure 7-1, this capture shows a materially stronger signal and lower visible latency variation. The source package does not provide synchronized timestamps or a continuous log, so the screenshots should be treated as representative states rather than a controlled statistical comparison.

# 08 ENGINEERING INTERPRETATION

Clearly separated from the source-derived observations

## Interpretation of the 9.78 km results

- The directional antenna result indicates that additional antenna gain and focused energy materially improve the link margin at the longest tested distance.
- The omni antenna remaining smooth at 512 kbps but showing minor stuttering at 1024 kbps is consistent with a reduced fade margin: a higher application bitrate leaves less tolerance for retransmissions and latency variation.
- The -94 dBm / 12% screenshot represents a weak-link state. The visible ping variation up to approximately 206 ms is consistent with retransmissions, queueing or temporary channel degradation, but the screenshot alone cannot identify the exact cause.
- The -79 dBm / 14 dB SNR screenshot represents a stronger state and shows a narrower visible ping range. This supports the practical value of better alignment, antenna gain and path clearance.

## Customer deployment guidance

| Use case | Recommendation |
|---|---|
| **For maximum stability at ~10 km** | Use the directional antenna, verify alignment at both ends and keep the video bitrate at or below the validated 1024 kbps setting. |
| **When omni coverage is required** | Use 512 kbps as the source-supported stable setting at 9.78 km; validate 1024 kbps at the final installation before release. |
| **Installation** | Increase antenna height where practical, minimize cable loss and maintain clear polarization/orientation. |
| **Future validation** | Record continuous RSSI/SNR, packet loss, ping statistics, UDP/TCP throughput, weather, GPS coordinates, antenna gain and spectrum occupancy. |

These recommendations are engineering inferences based on the supplied observations and should be revalidated for different hardware revisions, antennas, regulatory power limits, terrain and interference conditions.

# 09 CONCLUSION AND RECOMMENDATIONS

Customer-facing outcome statement

| 3.86 KM | 9.78 KM DIRECTIONAL | 9.78 KM OMNI |
|---|---|---|
| **Smooth** | **Smooth** | **Smooth at 512** |
| Directional AP / omni STA | 512 and 1024 kbps | Minor stutter at 1024 |

Conclusion: The supplied evidence demonstrates practical long-range operation of the 5.8 GHz video transmission system at 3.86 km and 9.78 km under the documented field configurations. The directional antenna provided the strongest long-range result, maintaining smooth video at both 512 kbps and 1024 kbps over 9.78 km. The omni configuration remained smooth at 512 kbps and showed minor stuttering at 1024 kbps over the same route.

Recommended customer configuration: For deployments approaching 10 km, use the directional antenna and a validated video bitrate of 512-1024 kbps. Where omni coverage is required, 512 kbps is the source-supported stable setting at the tested distance.

Qualification statement: These results apply to the tested firmware, radio settings, antenna arrangements and field conditions. They are not a guarantee of identical performance in other interference, terrain, weather or regulatory environments.

## Recommended next test package

- 10 km repeat test with synchronized continuous RSSI, SNR, ping and packet-loss logging.
- UDP throughput and application video bitrate captured simultaneously.
- Directional antenna gain, cable loss and verified EIRP documented.
- Photographs of antenna orientation and measured installation heights at both endpoints.
- Weather, wind, spectrum scan and exact coordinates recorded in the test sheet.

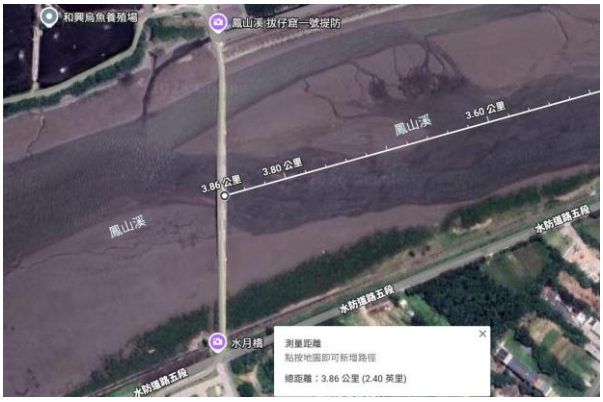
# A

# APPENDIX A - REFERENCED MEDIA

Files named in the original source report

| Media item | Reference |
|---|---|
| **3.86 km video** | Video_260721155939T TX 天德堂&RX 水月橋上.mp4 |
| **9.78 km directional video** | Video_260721162958 指向天線 TX 坡頭&RX 南寮.mp4 |
| **9.78 km omni video** | Video_260721164457 圓頭 ANTTX 坡頭&RX 南寮.mp4 |
| **Runtime screenshot A** | Media-player title references the 9.78 km omni-antenna video. |
| **Runtime screenshot B** | Device and ONVIF runtime status capture. |

The three video files are referenced by name in the source report but were not embedded in the supplied PDF. This Word document includes the two runtime screenshots provided in the conversation.




**Shuiyue Bridge map detail**




**Tiande Temple map detail**




**Nanliao Fishing Port map detail**




**Potou Fishing Port map detail**

# B1

# APPENDIX B - ORIGINAL SOURCE PAGE

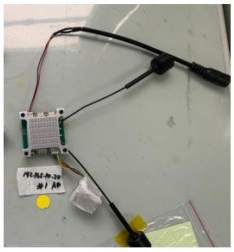
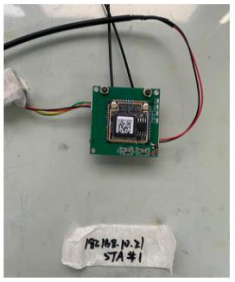
Original field test record, page 1 of 3

宋總 5.8G 圖傳遠距離測試

TEST DATE : 202607021@TX 天德堂, RX 水月橋&TX 坡頭漁港 ,RX 南寮漁港

TEST SAMPLE:

**FW:fw-20260717-4uu8.bin**

| | | |
|---|---|---|
| AP 端<br>(ANT:圓頭&指向天線) |  |  |
| STA 端 + CAMERA<br>(ANT:圓頭) | <br> |  |
| EUT setup | Frequency:36<br>Channel:5.8G<br>Baud Rate:115200<br>Bandwidth:20M<br>MCS:MCS0<br>Power:31.5 |  |

Original source report - page 1

# B2

# APPENDIX B - ORIGINAL SOURCE PAGE

Original field test record, page 2 of 3

測試地點:

| | | |
|---|---|---|
| AP@水月橋上 | STA@天德堂 | 3.86km |
|  |  |  |
| AP@南寮漁港 | STA@坡頭漁港 | 9.78km |
|  |  |  |

TEST LOCALTION #1 : AP@水月橋上 , STA@天德堂

| | | |
|---|---|---|
| AP 端 @水月橋上<br>架高約 1.5m<br>海拔約 8M<br>指向天線 |  | |
| STA 端 @天德堂<br>架高約 1.5m<br>海拔約 85M<br>圓頭 ANT |  | |
| Result | 影像流暢<br>Video_26072115<br>5939T TX天德堂&<br>請參考 VIDEO | |

Original source report - page 2

# B3

# APPENDIX B - ORIGINAL SOURCE PAGE

Original field test record, page 3 of 3

TEST LOCALTION #2 : AP@南寮漁港,STA@坡頭漁港

| | | |
|---|---|---|
| AP 端 @南寮漁港<br>架高約 1.5m<br>(ANT:圓頭&指向天線) | <br> |  |
| STA 端 @坡頭漁港<br>架高約 1.5m |  | |
| Result | 指向天線:Bitrate : 512 &1024, 影像流暢<br>Video_26072116<br>2958 指向天線 TX<br><br>圓頭 ANT:Bitrate : 512 影像流暢 , 1024 些微卡頓<br>Video_26072116<br>4457 圓頭ANTTX | |

Original source report - page 3