WIRELESS BROADBAND ALLIANCE

WI-FI 6/6E INDUSTRIAL IOT (IIOT)

IEEE LIAISON

VERSION V1.0

Program Summary

- Workgroup mandate & scope
  - Explore uses of WiFi (6/6E/7) capabilities for Industrial IOT (IIOT) applications
  - Define and validate critical KPIs (latency, reliability, mobility, etc)

- 2022 Accomplishments & plans
  - Publication of Wi-Fi 6E for Industrial IOT (IIOT) whitepaper
    - https://wballiance.com/wi-fi-6-6e-for-industrial-iot-whitepaper-ieee/ PW: **WBA@IEEE**
  - Field trials of WiFi6E IIOT use-cases in progress (stand-alone & 5G/Wi-Fi convergence)
  - *Formalization of relationships with complimentary industry groups*

WIFi6/6E Industrial use-cases

Sensors

Video & AMR Video fusion

Autonomous Mobile Robots (AMR)
Automated Ground Vehicle (AGV)

Safety controls

AR/VR/XR

WIFi6/6E Industrial use-cases

Autonomous Mobile Robot (AMR)
Automated Ground Vehicle (AGV)

Value

- Essential connectivity
- Logistics (warehousing)

Technical requirements (typ.)

- Latency: <10-20ms
- Jitter: < 1ms
- Throughput: >10Mb/s (UL)
- Speed: <25km/h
- Reliability: >99% or better
- Wi-Fi to Wi-Fi handoff times: commensurate with latency & speed
- Location: Wi-Fi, etc
- Multi-access: indoor Wi-Fi to outdoor 5G transition (public / private) e.g. via ATSSS

WIFi6/6E Industrial use-cases

Safety controls

Value

- Convenience
- Flexibility
- Cost (cabling)

Technical requirements (typ.)

- Latency: <1ms (**Wi-Fi 6 TSN**)
- Reliability: 99.99…% (safety)
- Mobility (Wi-Fi handoff): commensurate with reliability/latency target
- Location/ranging: Wi-Fi, etc (accuracy – e.g. 30ft +/- 1ft)

WIFi6/6E Industrial use-cases

Sensors

Value

- Flexibility (anywhere)
- Cost (cabling)

Technical requirements (typ.)

- High-scale (e.g. 1000s)
- Reliability: high (non safety)
- Coverage: e.g. high-ceiling
- Power consumption: low (battery powered e.g. TWT)
- Periodic low-volume (20Kbps/site, periodic), Wi-fi or wired and aggregated to Wi-Fi via GW

WIFi6/6E Industrial use-cases

Video-AMR fusion

Value

- Multiple views of scene (e.g. blind-spot removal)
- Safety (e.g. collision w/ human)
- Asset identification
- Digital-twins

Technical requirements (typ.)

- Latency: < 20ms
- Jitter: <1ms
- Throughput: 50-250Mb/s [per AMR] – multi-GBps / AP
- Reliability: high

WIFi6/6E Industrial use-cases

AR/VR (1x2x4/8K 60-90+ fps)

Value

- Operational efficiency
- Flexibility
- Remote control/training (VR)
- Tablet MR (e.g. sensor data overlay)
- Today HMD but future glasses
- Edge/cloud-compute (ML/AI)

Technical requirements (typ.)

- E2E Latency: <10ms [not critical]
- High-throughput: up to 100Mb/S
- Mobility/handoff (not critical)
- Reliability: high (not safety)

WIFi6/6E Industrial use-cases

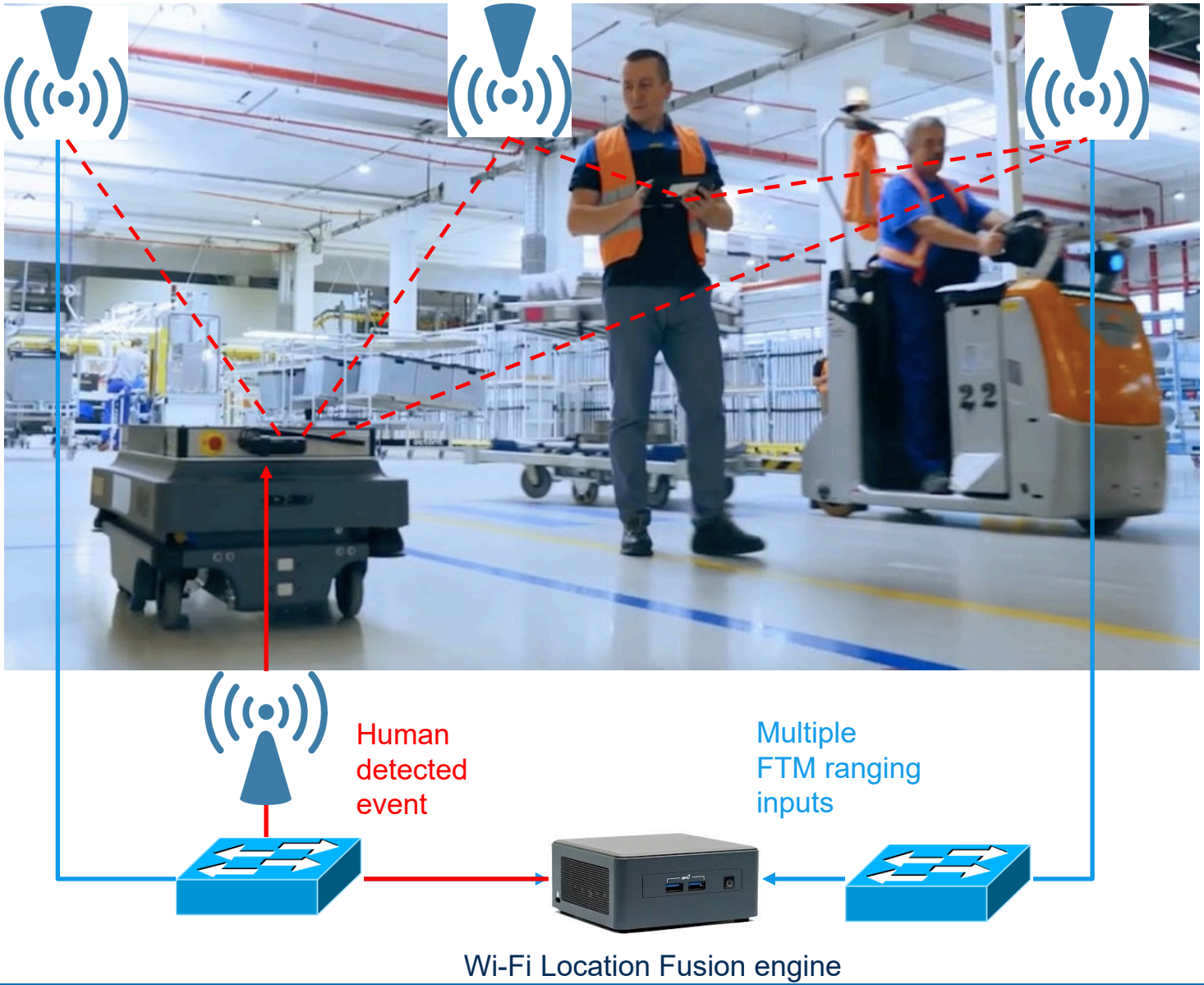
Wi-Fi (FTM) positioning

Value

- Asset tracking
- Indoor navigation (BLUE dot)
- Fusion (Wi-Fi, BLE, UWB, …)
- **Safety** (e.g. collision w/ human)
- Security

Technical requirements (typ.)

- Multi-lateration
- Currency: ~50ms (1ft@20kph)
- Accuracy: <1ft
- Reliability: high



WBA Planned Trials

Trial #1 WBA + Exor

Critical safety control system

<1ms 99.99% control loop (WiFi-6 TSN)

Trial # 2 TBA

AMR (Wi-Fi + 5G)

Control + onboard video

Possible WBA IEEE Collaboration areas

Thought: Leverage WBA Trials to showcase & experiment w/ latest IEEE STDs

Low-latency

802.1 TSN STDs

- 802.11 inclusive mgmt. (e.g. .1Qdj)
- 802.11ax/be-specific profile

Related 802.11 STDs

- .11k,v,r (roaming)
- .11 FTM/TM (time-sync)

802.11be STDs

- QoS evolution (e.g. SCS, rTWT, etc)
- Reliability (e.g. QoS-aware rate-control, MLO)

THANK YOU !

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