RFID Automated Asset Tracking

Tony Wilson & Tom Copeland

Asset Management – AIR Sector

28th Sept 2020

BAE SYSTEMS

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- Global defence supplier

- Established positions in **AIR**, MARITIME and LAND domains

- Growing position in cyber security

- Principal markets – US, UK, Saudi Arabia and Australia

- More than 87,800 employees in over 40 countries

- Customers in around 80 countries

- 2019 sales of £20.1bn

- £11bn+ spend with around 22,000 directly contracted suppliers globally

NOT EXPORT CONTROLLED

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Air 52%

- Manufacture, development, upgrade and in-service support of Typhoon combat aircraft

- Workshare partner for the design and manufacture of major sub-assemblies and systems, and provision of support for F-35 Lightning II combat aircraft

- Design, manufacture and support of electronics equipment for military & civilian aircraft

- Development of next-generation unmanned air systems and defence information systems

- Design and manufacture of missiles and missile systems through a 37.5% interest in MBDA

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AIR – Asset Management

Responsible for:

Off-Site Storage
& Asset Governance:
Asset movement controls
Risk reviews & reporting
Assurance audits:
Main Production sites
Supply chain
USA & KSA

Warton, Preston

Samlesbury, Preston

Hull

Manchester

London

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Why do we need to track our assets?

- Asset losses

- Value of assets written off as 'lost' over previous 15 years = £x m

- What's the root cause?

Logistics or Production Operatives move assets

Tracking system needs 'Mandraulic' update every time an asset moves....

Something needed to change....

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Automated tracking investigation, using RFId

- Over 2 yrs investigating best value for money solution & best supplier.

- **Active system:**

- + very accurate   + longer range

- - Requires a lot of infrastructure

- - Requires batteries in each tag changing ~ every 6 months

- - Tags tend to be larger (to fit battery in)

- - Expensive

- **Passive system:**

- + much cheaper   + easier to install / less infrastructure   + easier/cheaper to maintain

- - Poorer location accuracy

- - Shorter range

- **Our solution:**

- Passive tag system
    - Detection Gateways positioned at strategic points within buildings to maximise detection opportunities.
    - Used double tagging to increase detection rates
    - Partnered with flexible, innovative company - Codegate

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Warton site – areas needing asset tracking

3 in live operation

9 facilities

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Samlesbury site – areas needing asset tracking

9 facilities

2 in live operation

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Pilot project 2017

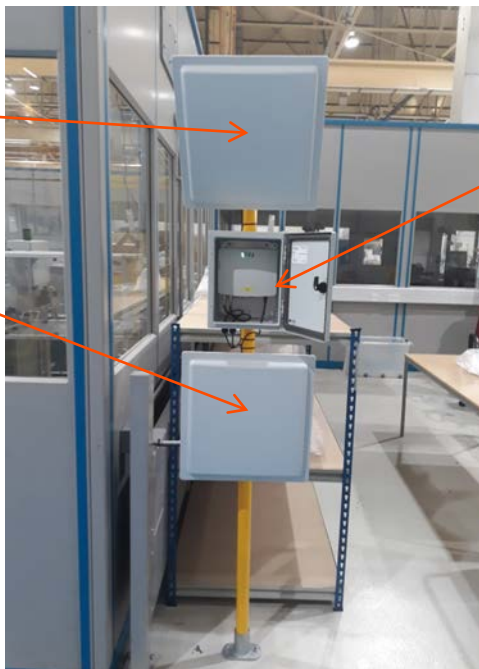RFID Portal – "Gateway"

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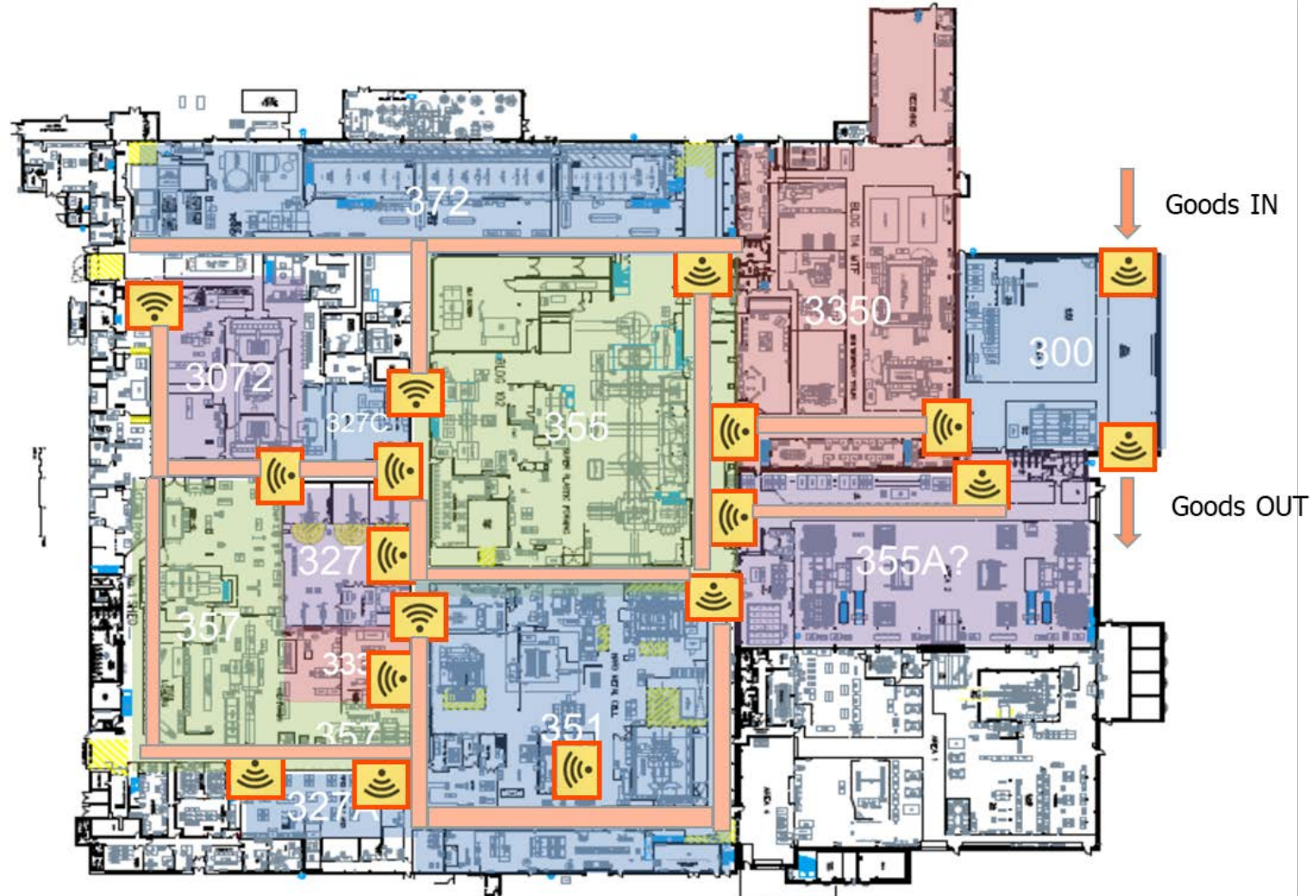
Passive RFId components

Antenna

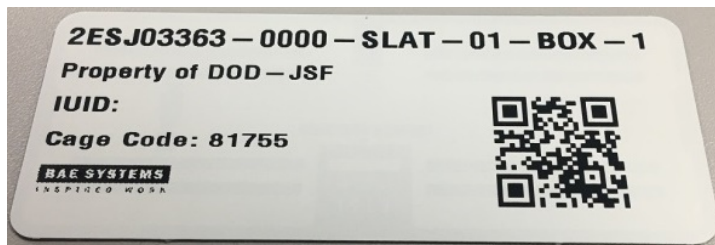- Different shapes / sizes
- Varying power output

Tag

- Customisation options
- Printable
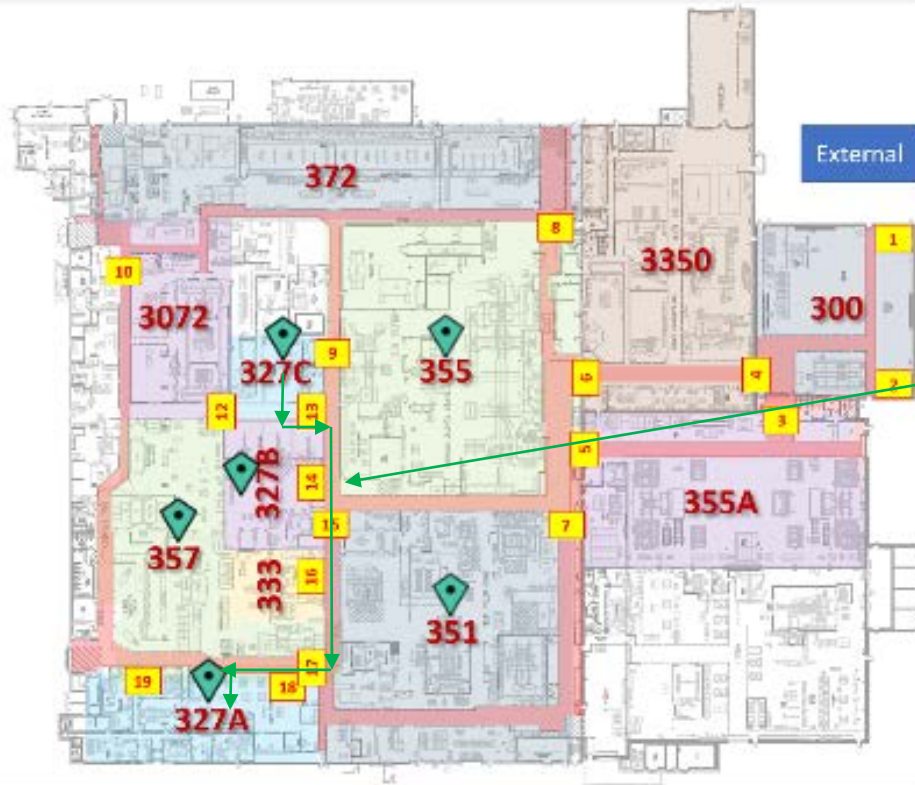- Varying sizes
- Contains on-board antenna and chip

Reader

- Concealed
- Data filter / processor
- Intranet connected
- Powers up to 8 antennas

All Passive RFID equipment is governed by EPC Gen 2 Global Standard

2ESJ03363 — 0000 — SLAT — 01 — BOX — 1
Property of DOD — JSF
IUID:
Cage Code: 81755
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INSPIRED WORK

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"Lime" Middleware server/software – GUI Output

Movements for Asset 2ASJ01553-0000-WLFX-01

Pinch point	Location (deduced)	Date and Time
N/A	327A	05/09/2017 10:53:49
TTP19	357	04/09/2017 15:55:24
TTP18	327A	04/09/2017 15:55:14
TTP17	357	04/09/2017 15:55:10
TTP15	351	04/09/2017 15:54:58
TTP14	327B	04/09/2017 15:54:50
TTP13	355	04/09/2017 15:54:37
N/A	327C	04/09/2017 15:30:08
TTP13	327C	11/08/2017 11:38:24
TTP14	327B	08/08/2017 10:16:12

Timescale of 15:54 to 15:55

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Pilot project findings

- 18 Portals installed at pinch points in the facility – 2m read range.

- 650 assets tagged and in circulation

- Success was planned at > 75% detection rates
  - After tweaks the capture rate is now > 97%

- RFId v conventional "mandraulic" system compared after 3 months

- 47% of asset locations were more accurate with RFId

- **Other improvements:**

- Full stock check of the building
  - Old method = 1 week   RFId = 4 hours with handheld reader

- Audit preparation time reduced from 3 days to 3 minutes

Pie chart: NO 47.25%, YES 51.88%, #N/A 0.87%

Lime location is last updated in all cases

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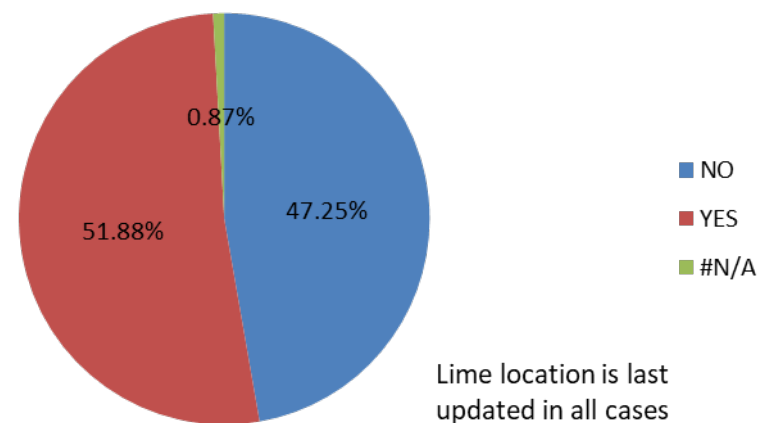
Improvements / market shifts since 2017

- **Electronic beam scanning introduced**
  - narrow beams = greater distance – **up to 20m**
  - additional signal detection/amplification techniques = greater distance
    - Found through Codegate & RFID Live 2018!

- **Improved passive tags**, via Codegate

- **Flexible development of Middleware**: Lime (built by Codegate)
  - Codegate very responsive to feedback
  - Able to improve and grow their product quickly

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Issues encountered

- Tags:
  - On Metal detection range <5cm, looked at "on metal" tags
    - Innovated – 6mm Foam pad, 10cm long with 3M adhesive on back = 1m detection range
  - Can't always stick a tag to an asset – chemicals / heat

- Roof mounted RF Controls antennae:
  - Detection issue: Overhead cranes in beam path
  - Installation issue: dust on beams above aircraft manufacture
    - Innovated: mount on perimeter walls 4m+ high looking diagonally downwards, forming a "detection curtain"
  - Use of beam calculations to position antennae tilt at optimum

- POE+ Cat 6 Ethernet cable lengths
  - Above 75m causing problems
    - Currently looking at:
      - POE + injectors
      - Additional Switch/Cabinet units (but costly)

- Covid-19

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Summary

- AIR Sector business case authorised from the success of the Pilot
  - Rollout now commenced:
  - 4 of 18 facilities are now live
  - Majority of infrastructure now in place:
    - A mix of Portals and RF Controls antennae used to optimise the system
    - Tagging methods are being improved
    - Final testing and integration due early 2021

- Improvements:
  - Could use Wi-Fi if the buildings have it pre-installed.
  - Passive systems are improving – electronic beam forming / receiver units
  - Hybrid tags – powered by 3g mobile signals / WiFi / vibration

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Plans for the future

- Complete the 18 facility roll-out (by end 2021)

- Roll-out to a further 3 facilities

- Continue to investigate tagging in different ways to accommodate the full range of assets

- Integrate Lime into our factory asset location system

- Stock Checking using a robot at night to "patrol" the facility or
- Stock Checking larger areas using a drone, fitted with RFID detection system

- RFId Live 2021/2022? will be used to investigate additional benefits/add-ons

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Questions

QUESTIONS ???

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