



Asset Tracking Solutions for Real-Time Asset Intelligence

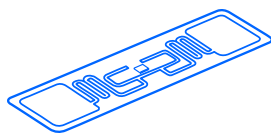
TECHNOLOGY SELECTION GUIDE

Barcode, RFID, or BLE?

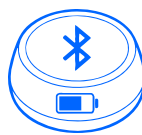
A practical framework for matching the right asset tracking technology to your environment - and avoiding the mistakes that make these projects fail.



Barcode & QR



RFID



BLE

01 Five questions before you choose

Answer these in order. They determine the technology far more reliably than any specification sheet - and most failed deployments skipped one.

- 1 What are you tracking, and what is it worth?**
 Value sets the sensible ceiling on cost per tag - but value is not just the purchase price. A \$30 beacon on a \$200 asset rarely pays back; on a \$35,000 calibration tool it is trivial - and on a \$40 fixture that halts a line when it goes missing, it pays back faster than either.
- 2 Where does it live, and what is the environment like?**
 Metal, liquids, outdoor exposure, wash-down and wipe-down all change which tags work. This is the question most often skipped - and the most expensive to get wrong.
- 3 How often does it move - and along what paths?**
 Predictable paths through doorways or process stages suit RFID choke points. Free movement - across an open floor or an open outdoor space - suits BLE.
- 4 Do you need to know when it moves, or just where it ends up?**
 RFID answers *when*: a tag crossing a portal as it leaves a room is a timestamped event. BLE answers *where*: a continuous position you can walk to. Event awareness and end-state location are different problems.
- 5 Do you need to detect unexpected movement?**
 If yes, manual scanning is already disqualified - a barcode only records movement somebody remembered to scan.

02 The three technologies

What each one actually is, where it wins, and what it will cost you in attention.



Barcode & QR

MANUAL, LINE-OF-SIGHT

A printed label read one at a time by a person with a scanner. QR adds data capacity, phone readability and damage tolerance, but shares every fundamental limit of barcode.

BEST WHEN

Under roughly 500 tracked items in a controlled, low-movement environment where assets are rarely lost.

WATCH OUT FOR

You have to see it to scan it. Accuracy depends on perfect human compliance on every shift, and it degrades silently.



RFID

AUTOMATED, NO LINE-OF-SIGHT

A battery-free tag powered by a reader. Think of it as a digital barcode that does not need to be seen - not a GPS tracker and not an AirTag.

BEST WHEN

High volume and bulk reads; movement through defined choke points; audits that need to happen more frequently than once a year.

WATCH OUT FOR

Location is inferred from reader proximity, so antenna placement is a design decision. Metal reflects RF - plan for on-metal tags.



BLE

CONTINUOUS, REAL-TIME

A battery-powered beacon broadcasting continuously to fixed gateways, which trilaterate its position. The AirTag analogy is fair here.

BEST WHEN

Real-time visibility across large facilities, assets moving freely without choke points, and sensor telemetry such as temperature or shock.

WATCH OUT FOR

Battery replacement is manageable at 50 tags and an operational program at 500+. Metal affects BLE just as much as RFID.

03 Side-by-side comparison

There is no single winner. The right answer depends on your environment, your volume, your use case, and how your assets move.

Factor	Barcode / QR	RFID	BLE
Cost to start	Low	Medium-High	Medium-High
Line-of-sight required	Yes	No	No
Bulk reads	No	Yes	Yes
Asset findability	Low	Medium	High
Movement detection	Manual only	Event at choke points	Inferred from position
Unexpected movement alerts	No	Yes	Yes
Metal sensitivity	Low	High	High
Battery / maintenance	None	None (passive)	Yes
Outdoor / harsh environments	Poor	Good (right tags)	Good (right tags)
Scalability	High	High	Medium
Data collection	Human – manual scan	Automated	Automated
Audit frequency	Annually	Weekly/monthly	Continuous

Shading marks where a technology is favorable or limiting for that factor. It reinforces the value in the cell; it never replaces it.

RFID and BLE in detail

Most shortlists come down to these two. This is where they differ.

Feature	Passive RFID	BLE
Location style	Checkpoint-based; location from reader proximity	Continuous real-time; RSSI trilateration
Read range	Short (up to 10 m)	Longer (30 to 100+ m)
Power source	No battery (powered by reader)	Internal battery (required)
Cost per tag	Low (\$0.10 – \$5.00)	Moderate (\$12 – \$30+)
Infrastructure	Specialized RFID readers	Lower-cost gateways; works with phones
Data capacity	Low (kilobytes)	High (megabytes)

04 Environment and use-case guide

Find the row closest to your situation. Hybrid deployments are common and legitimate - many facilities run two of these for different asset classes.

Use case / environment	Best fit
WIP on a factory floor moving through process stages	RFID at choke points / stations
Tools moving between jobs or departments; unexpected-movement risk	RFID
Lab equipment tracking and calibration compliance	RFID
IT assets moving freely across open office or campus	BLE
Data-center assets in metal-dense racks; full audit trail required	RFID with on-metal tags
Outdoor or harsh environments	RFID (on-metal / weatherproof tags) BLE (rugged tags)
Low volume, low movement, assets rarely lost or moved	Barcode / QR may still be right
Large facility with assets moving freely; real-time location needed	BLE

05 Ten mistakes to avoid

Choosing the technology

- ☐ **Staying on barcode because it is the status quo** - and living with the daily frustration of not finding assets or detecting movement.
- ☐ **Upgrading to expensive laser-etched barcode** - it improves durability, but scratches and oil stains still defeat the scan - and it solves neither the search nor the movement problem.
- ☐ **Assuming RFID is too expensive** - without a total-cost-of-ownership calculation that includes labor saved and the opportunity cost of assets nobody can find.
- ☐ **Not understanding RF behavior in your environment** - wrong tags, wrong antenna placement, dead zones.
- ☐ **Assuming BLE avoids RFID's metal problem** - it does not. Beacon placement needs the same care as RFID antennas.

Deploying it

- ☐ **Choosing BLE without planning battery maintenance** - manageable at 50 tags, a real operational burden at 500+.
- ☐ **Buying on tag and reader cost alone** - without factoring in software, integration and ongoing maintenance.
- ☐ **Underestimating barcode's data-quality problem** - accuracy depends entirely on human compliance, and it degrades silently.
- ☐ **Accepting annual audits as the norm** - without asking whether that frequency is sufficient. RFID makes monthly - or even weekly - practical.
- ☐ **Not involving end users in the selection** - the single biggest cause of low adoption, whichever technology you choose.

06 Where to go from here

The five questions on page 2 will get you most of the way. The remaining uncertainty is almost always about your specific environment.

Book a free 20-minute technology assessment

We map your environment, asset classes and movement patterns to the right technology - including telling you when barcode is still the correct answer. No obligation, and no pitch.

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RFID vs Barcode vs NFC vs QR Code: Complete Comparison Guide

assetpulse.com/blog/rfid-barcode-nfc-qr-code-comparison

Advantages and Disadvantages of RFID

assetpulse.com/blog/advantages-disadvantages-of-rfid-benefits

How BLE Asset Tracking Solves Problems Traditional Methods Cannot

assetpulse.com/blog/how-ble-asset-tracking-solves-problems

RFID Shielding and Signal Blocking: Complete Guide

assetpulse.com/blog/rfid-shielding-signal-blocking-rf-signal-management

RFID Deployment Best Practices

assetpulse.com/blog/rfid-deployment-best-practices

About AssetPulse

Founded in 2005 and headquartered in San Jose, California, AssetPulse delivers hardware, software, specialized tags and consulting for real-time asset intelligence - serving Fortune 1000 companies and government agencies including the Army, Air Force and US Department of Energy. We deploy RFID, BLE and IoT, which is why we can tell you which one you actually need.



Passive RFID tags



Handheld RFID reader



Fixed BLE gateway