MESHED

Why People Counting Matters

Leveraging real-time occupancy data for better performing spaces

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Executive Summary

People counting, the measurement of how people use, occupy and move through buildings, public spaces and precincts - has become a critical input for improved customer experience, modern planning, building operations and investment decision-making. Across government, property, transport, retail, tourism, urban design and commercial sectors, accurate pedestrian and occupancy data enables organisations to replace assumptions with evidence-based data, improving asset utilisation, customer experience, safety outcomes and economic performance.

People counting systems are fast becoming a significant global industry driven by smart buildings, smart cities, and demand for real-time occupancy analytics for commercial spaces.

The people counting technology sector is expected to grow, with a current market value of USD 1.46 billion in 2025. The sector is expected to further grow to USD 4.69 billion by 2034-an impressive CAGR of 13.89%-highlighting the increasing demand for data-driven insights in physical spaces.[1]

This white paper provides an overview of contemporary people counting approaches, the environments in which they are best suited and the types of insights they generate. It also introduces a new, privacy-preserving solution leveraging long-range LoRaWAN® connectivity that has been proven at scale across more than 100 cities worldwide.

This paper outlines the importance of people counting in data-driven decision-making, with a focus on the needs of both government and private sector operators. It examines the options and technologies currently in use, and introduces an emerging approach to people counting using LoRaWAN® technology. Collectively, the paper is intended to assist managers of key public and private places and spaces to better understand the critical role people counting plays in urban planning, asset management, economic development, and customer experience.

The intent is to provide readers with a clear understanding of the value and relevance of current people-counting approaches, outline optimal technology options within a complex regulatory and privacy landscape, and present a low-risk pathway to begin measuring space utilisation quickly and cost-effectively.

About Meshed

Who We Are

Meshed is a global IoT company specialising in enterprise-grade IoT solutions for smart cities, industrial operations, asset management, utilities and environmental monitoring. The company is recognised as one of the earliest and most experienced adopters of the LoRaWAN® communications standard in the Asia-Pacific region, and has expanded to deploy smart cities and industrial IoT solutions to the U.S.

Meshed enables organisations to unlock real-time, actionable data for remote asset management and next-generation telemetry through affordable, secure and highly scalable managed LoRaWAN® solutions. Its focus is on delivering practical, production-ready IoT deployments that can be rolled out reliably at scale.

In 2018, Meshed became the first solution provider globally to launch a LoRaWAN®-based Smart Cities Starter Kit, providing municipalities with a low-risk, out-of-the-box pathway to deploy operational IoT solutions. In the same year, Meshed designed and launched the award-winning nCounter pedestrian counting solution, now deployed widely across public and commercial environments.

500M+
People counted globally

10+
Years deploying LoRaWAN solutions

100+
Cities deployed

1000+
nCounter devices deployed

PROVEN AT SCALE

Meshed has delivered smart cities and intelligent asset management solutions for over 100 cities globally. Most recently, the company has completed a successful Pilot of the nCounter Counter People Counting solution for the NYC Smart City Testbed in partnership with the Office of Technology Innovation.

Meshed is a proud partner of the LoRa Alliance®, the Smart Cities Council and the Australian based Connectivity Alliance (formerly the IoT Alliance of Australia). Meshed is also a partner of The Things Industries.

SECTION ONE

What is People Counting

Every city precinct, commercial building, open space realm, transport hub, trader district and tourism destination tells a unique story through the people who use it. How many arrive, when they come, how long they stay, and where pressure builds. People counting is the practice of capturing that story in data rather than assumptions, giving the people responsible for physical spaces the evidence they need to plan, invest and operate with confidence.

What is People Counting?

In today's digital landscape, people counting has evolved beyond simple detection, using IoT sensors, intelligent data processing, and scalable connectivity to generate accurate, real-time insights into movement patterns and space utilisation.

This real-time footfall data provides valuable insights into behaviour, occupancy, and performance, empowering operators to replace manual counting with continuous, data-driven decision-making.

Key insight

In essence, people counting converts real-world movement into quantifiable data you can base business decisions on.

At a high level, people counting supports:

- Evidence-based planning for cities, place making and economic development.
- Activation of main streets and town centres, including events and seasonal initiatives.
- Improved visitor experience for tourism, events and investment attraction.
- Sustainable management of beaches, parks, gardens and other natural assets.
- Evaluation and justification of major capital investments.
- Understanding movement patterns, peak usage times and safety flows.

The following pages outline the key sectors where people-counter sensors are commonly used - spanning public, private, commercial, retail, and special-purpose environments.

WHAT IS PEOPLE COUNTING?

Key Sectors Using People Counting Data

Transport & Mobility

TYPICAL ASSETS

Airports (land side and air side public areas); Train, metro and light rail stations; Bus interchanges and stops; Ferry terminals and wharves; Ride-share and kerbside pickup zones.

WHO USES IT

Transport authorities and infrastructure operators.

KEY OUTCOMES

First-mile analysis, capacity planning, safety and accessibility, transport integration and utilisation management.

Education Campuses

TYPICAL ASSETS

Universities and TAFEs (lecture theatres, libraries, dining); Student accommodation and residential colleges; Research facilities and controlled-access zones.

WHO USES IT

Universities, schools, education authorities, trade colleges.

KEY OUTCOMES

Space utilisation, campus planning, safety, service optimisation and event monitoring.

Tourism, Transport & Entertainment

TYPICAL ASSETS AND SPACES

Tourist attractions, landmarks and lookouts; national parks, reserves and trails; beaches and coastal areas; historic sites and monuments; theme parks, zoos and attractions; restaurants, cafés and dining precincts; entertainment venues (cinemas, arcades, bowling centres).

WHO USES IT

Tourism bodies, attraction operators, hospitality venues.

KEY OUTCOMES

Visitation measurement, dwell-time analysis, experience optimisation, seasonal planning and funding justification.

KEY SECTORS

Key Sectors Using People Counting Data

Government & Smart Cities

TYPICAL ASSETS

Footpaths, CBDs, town centres and precincts; public parks, playgrounds and open spaces; libraries, community centres and civic buildings; city-run museums and galleries; public toilets and amenities; recreation facilities; city-managed events and festivals; performing arts and open-air auditoriums; emergency evacuation routes and public safety zones.

WHO USES IT

Local and state governments, councils, city authorities.

KEY OUTCOMES

Evidence-based planning, asset utilisation, maintenance optimisation, public safety, place making and economic development insights.

Retail Spaces & Commercial Buildings

TYPICAL ASSETS

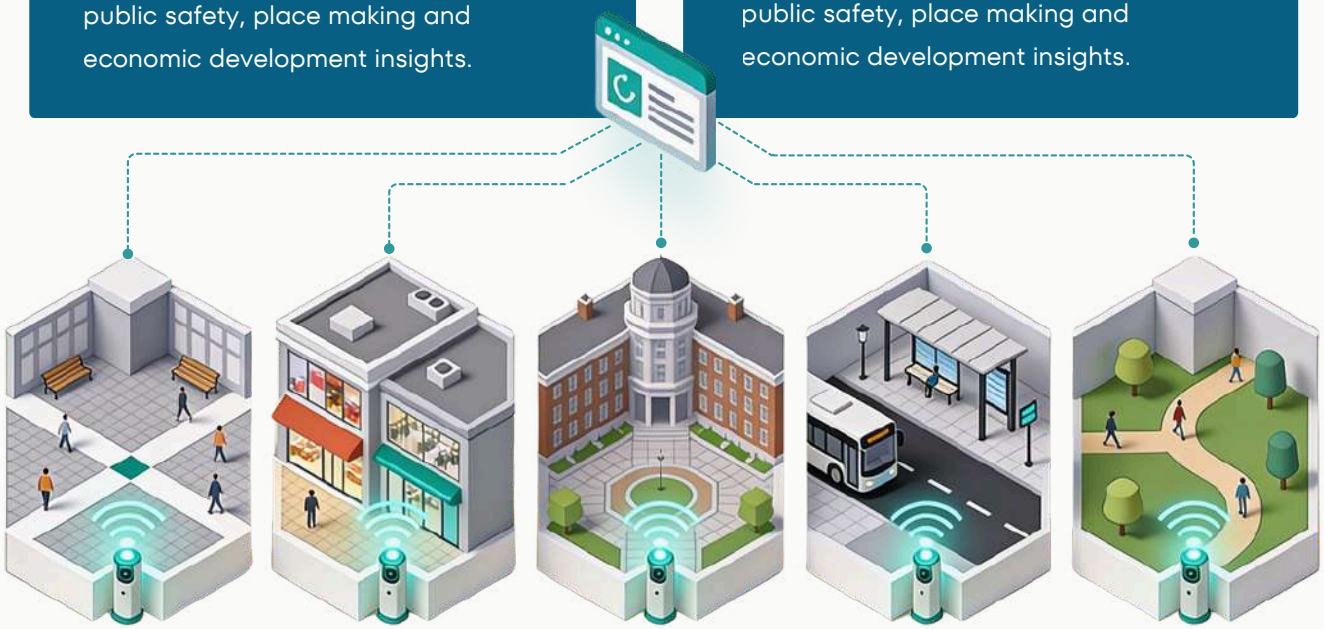
Shopping centres, outlet malls and retail precincts; supermarkets and large-format retail; main streets and trader districts; office buildings and mixed-use developments; corporate campuses and co-working spaces; industrial offices and commercial warehouses.

WHO USES IT

Retailers, property owners, asset managers, developers, leasing agents.

KEY OUTCOMES

Evidence-based planning, asset utilisation, maintenance optimisation, public safety, place making and economic development insights.



WHAT IS PEOPLE COUNTING?

Why People Counting Matters

The ability to accurately quantify how many people occupy a space, pass a retail frontage, dwell near a public artwork, or use community infrastructure such as playgrounds and basketball courts provides invaluable insight for those responsible for creating safe, accessible and welcoming public environments. As space becomes increasingly constrained and footpaths, parks and civic amenities are more heavily contested in major cities, understanding how people move through and use these spaces is critical to supporting vibrant urban life.

People counting replaces assumptions and anecdotal evidence with reliable, data-driven insights. It enables organisations across government, property, retail and transport to optimise operations, enhance user experience, improve safety outcomes and support sustainable growth.

While commercial building occupancy has recovered since COVID-19, utilisation levels remain below pre-pandemic norms. In Australia, average office utilisation across the week is approximately 50-67%, with higher rates on peak days but overall attendance still below historical full-time norms (CBRE, 2024).[3] In Europe, office occupancy has risen toward the mid-50% range but remains below pre-COVID averages of around 70% (Savills, 2023).[4] In the United States and globally, hybrid work patterns have contributed to lower workplace utilisation, with U.S. levels observed in the 30-40% range compared with higher utilisation in Europe and Asia-Pacific (XY Sense, 2024).[5]

The COVID-19 Pedestrian Counting Index, released by Meshed in September 2020, used real-time footfall data from more than 200 nCounter devices across Australian cities and regional tourism hubs.

Analysed by the SMART Infrastructure Facility at the University of Wollongong, the Index combined pedestrian movement with mobility, commerce, environmental, and socio-economic indicators to measure the pandemic's immediate impacts and guide targeted recovery, stimulus and revitalisation efforts for local governments and economic development agencies.

Since the pandemic, Meshed has continued to deliver accurate people-counting data to cities across Australia, the Asia-Pacific, and the United States. Our customers consistently realise value from understanding how public amenities, such as restrooms, parks, playgrounds, rest areas, and tourism and recreation precincts, are utilised. These insights provide city leaders and public works teams with clear visibility into asset usage, enabling more efficient day-to-day maintenance and cleaning, as well as evidence-based planning to meet evolving population needs and future demand.

People counting provides objective, evidence-based insight into how places are used. It underpins better decision-making across urban planning, economic development, asset management and customer experience, replacing assumptions with measurable data.

WHAT IS PEOPLE COUNTING?

Key Value Proposition of People Counting

Across industries there are diverse reasons why space, property and facilities managers are seeking valuable real-time people counting data. Some of the most compelling reasons include:

1. Economic activity and place activation: Accurate footfall and dwell-time data enable cities and economic development teams to measure the real impact of precinct upgrades, events and activation programs. This evidence supports investment attraction, revitalisation strategies and local business growth.

2. Culture, lifestyle and community engagement: People counting reveals how communities interact with cultural assets, public spaces and multi-use precincts. Insights into visitation and dwell behaviour support better design, programming and activation, helping create vibrant, inclusive places.

3. Asset management and operational efficiency: Understanding when and how spaces are used allows asset owners to align cleaning, maintenance and staffing with actual demand. This improves service delivery, reduces unnecessary costs and supports transparent, data-driven justification for ongoing investment-particularly important in constrained funding environments.

4. Safety, compliance and crowd management: Real-time and historical occupancy data helps manage crowd density, supports compliance with safety regulations, and informs emergency and evacuation planning across public and commercial environments.

5. Customer, visitor and retail performance: Movement and congestion insights enable improvements to layouts, staffing and resource allocation, delivering smoother experiences that increase satisfaction, repeat visitation and loyalty. For retail environments, people counting also supports analysis of conversion rates and marketing effectiveness.

6. Space utilisation and sustainability People counting highlights: underutilised and high-demand areas, supporting smarter space planning, potential repurposing and portfolio optimisation. When integrated with building management systems, it also enables occupancy-based control of lighting and HVAC, reducing energy use and operating costs.

7. Future planning and investment decisions: Long-term data trends inform forecasting, capacity planning and infrastructure investment decisions, ensuring future developments are aligned with actual patterns of use and community demand.

In summary

People counting replaces assumptions with evidence. It provides facilities managers and building operators with the intelligence required to improve efficiency, enhance safety and experience, support sustainable growth, and make confident, data-driven decisions in an increasingly complex urban environment.

SECTION TWO

Common People Counting Technologies

Understanding how people use space is not a new ambition. Organisations have counted visitors for decades using everything from manual tallies and periodic surveys through to advanced camera systems and mobile data analytics. Each approach carries its own strengths, costs and constraints. Choosing the right technology comes down to understanding what each approach was built for, where it works well, and what it requires to run.

Common People Counting Technologies

No single people-counting technology is universally the “best” option. Each approach offers distinct strengths and limitations, and the most suitable solution depends on the specific context of the location, the characteristics of the target audience, and the outcomes being sought. These factors should be carefully evaluated before selecting a people counting approach or technology.

Table 1: Comparative overview of common people counting technology categories

FEATURE	MANUAL COUNTING	AD HOC SURVEYS	SINGLE-POINT OPTICAL & THERMAL COUNTERS	AI EDGE PROCESSING (NON-CCTV)	CCTV / VIDEO ANALYTICS
PURPOSE / DEFINITION	Staff physically count visitors for short periods	Periodic observation studies, behavioural surveys & extrapolation	Line-of-sight occupancy sensors that detect movement, heat or crossing at entry/exit points, gates or single rooms	On-device AI analyses video feed for counts, direction & dwell	CCTV video streamed and analysed on servers for people & behaviour
COUNTING METHOD / DATA COLLECTED	Manual tallies; basic numbers	Observation + qualitative context	Heat/motion/Passive InfraRed (PIR)/Time of Flight (ToF) counts at single points (e.g. doorways, desks, single rooms). Best for controlled entry/exit; not suited to open public spaces or precincts.	Footfall, occupancy, direction, dwell, heatmaps, sometimes demographics	Full video enabling behaviour, dwell, movement & security review
ESTIMATED ACCURACY	Variable Prone to human error	Low-Medium Sample-based	Medium 60-90% dependent on flow & line-of-sight	High 95-99% claimed in retail environments	High Accuracy depends on camera quality & analytics
PRIVACY & RISK	Medium Signage may be required indicating footfall traffic is being counted	Medium Signage may be required indicating footfall traffic is being counted	High Privacy No personal data is collected	Medium Video processed locally but a camera is used; may require signage	Low Privacy High governance & privacy obligations due to recording and video capture. Signage required.
CONNECTIVITY & NETWORK	None	None	Battery or mains powered. BLE / IP / LoRa / NB-IoT / Wi-Fi / Serial	Requires power + network (Ethernet / PoE)	Requires IP network, server capacity & bandwidth
POWER & INSTALLATION	Labour only	Labour only	Mains or low voltage depending on device; fixed mounting	Mains power or PoE; fixed ceiling or wall mount	Mains/PoE; complex install + alignment
PRICE RANGE	Low One time labour	Low-Medium CapEx consultancy	Low-Medium Per device	Medium-High Per device	High CapEx + storage + integration + compliance
BEST USE CASE	Events, validation, small studies	Planning studies, visitor profiling	Doorways, corridors, indoor access control points	Retail stores, airports, malls, indoor precincts	Security-driven environments: stations, airports, casinos, campuses

Common People Counting Technologies

SUMMARY OBSERVATIONS

With a comparison of the attributes and features of several modern people-counting technologies, we can summarise how key user groups apply these techniques in ways that specifically align with the places and spaces they are responsible for managing or overseeing.

Local government & public spaces: Typically prioritise highly scalable privacy preserving solutions that can be deployed consistently across multiple locations at the lowest cost. The key metrics include people counts, dwell times and time of day peak periods.

Transportation Hubs & Activity Districts: Largely benefit from a combination of CCTV and sensor-based technologies to measure visitation levels and identify peak periods, enabling more effective service planning, maintenance scheduling, and safety management.

Retail & Shopping Centres/Malls: Usually benefit most from deploying advanced vision-based solutions, often complemented by location-based Wi-Fi analytics, to understand customer traffic, improve performance, and support more informed operational decisions.

Commercial Buildings & Districts: Tend to use a combination of sensor and vision-based technologies to provide a holistic view of how people use their spaces, improve operations, enhance safety and maximise value of their assets.

Events & Entertainment Venues / Stadiums: Use data from ticketing and POS systems, together with advanced CCTV solutions, to support crowd management, enhance security, and analyse attendee movement and behaviour.

Cultural and Tourism Precincts: Increasingly prioritise low-maintenance solutions that deliver accurate insights into footfall traffic, peak visitation periods, and visitor dwell times at specific exhibits or points of interest.

SECTION THREE

A New Approach to People Counting

Until recently, organisations looking to understand how people use space have been forced into difficult trade-offs. High-resolution insights often required complex, power-hungry systems and raised privacy concerns, while simpler solutions sacrificed accuracy or depth.

For operators managing large, public-facing environments, no single approach could deliver all of these at once. A different architecture was needed-one that combines low power operation, privacy-safe design, and scalable deployment without compromising insight.

A New Approach to People Counting

Many cities lack consistent and reliable data on pedestrian movement, limiting their ability to understand how public spaces and assets are used. This gap impacts both day-to-day operations and long-term planning across maintenance, safety, environmental management and economic development.

Assets commonly requiring better insight include major buildings, sporting fields, transport hubs, parks, event spaces and tourism precincts. Historically, city and building asset managers have relied on manual counts, on-site surveys, CCTV analytics, or mobile data sourced from telecommunications providers. While these approaches can offer insight, they are often costly, labour-intensive and difficult to scale across large and diverse asset portfolios.

More advanced digital people counting technologies - such as public Wi-Fi systems, camera-based analytics and object-sensing platforms - can further increase infrastructure complexity. These solutions typically require mains power and IP networks, introduce higher capital and operating costs, and raise privacy and governance concerns where video footage or personal device identifiers are captured, transmitted or stored.

As a result, many councils and government agencies have struggled to deploy people counting consistently and cost-effectively across their cities, limiting access to the accurate, long-term, privacy-preserving data needed for evidence-based planning, transport investment, placemaking and economic development.

The market opportunity

These challenges created a clear opportunity: to deliver a low-cost, portable and accurate people counting solution that could scale across cities, operate securely in public environments, and meet modern privacy expectations.

The emergence of low-power, long-range IoT networks, combined with advances in local (edge) processing, made it possible to rethink how people counting could be delivered - without cameras, without personal data, and without the cost and complexity of traditional systems.

A NEW APPROACH TO PEOPLE COUNTING

Introducing LoRaWAN-Based People Counting

In 2018, Meshed an Australia based IoT solutions company, developed nCounter: a world first people counting solution combining passive WiFi sensing with LoRaWAN® connectivity. nCounter is a camera-free approach that uses smart devices as an anonymous proxy for people generating accurate, aggregated footfall and dwell-time data while maintaining strict privacy by design.

Only totalised counts within defined geographic zones are transmitted at regular intervals over secure, low-power LoRaWAN® networks. No personal data, video footage or identifiable device information is collected or stored, allowing cities to gain reliable insights without introducing privacy or cybersecurity risk.

What is LoRaWAN®?

LoRaWAN® is a low-power, long-range wireless communications standard designed to connect sensors and devices across large areas using minimal energy. It enables small packets of data-such as occupancy, footfall, environmental conditions, or asset status-to be transmitted securely over kilometres without relying on cellular networks, cameras, or high-bandwidth infrastructure.

Developed and governed by the LoRa Alliance®, the standard is supported by a broad global ecosystem of device manufacturers, network operators, and systems integrators, and has seen widespread adoption across the US, Europe, Asia, and the Middle East.
LoRaWAN® supports battery or solar-powered devices with multi-year lifespans, operates reliably in dense urban and hard-to-reach environments, and uses end-to-end encryption by default.

A NEW APPROACH TO PEOPLE COUNTING

Proof Through Deployment: Smart Pedestrians Project

The capability of nCounter was first demonstrated through the Smart Pedestrians Project,[7] partially funded by the Australian Federal Government's Smart Cities and Suburbs Program.[8] The project was delivered in partnership with Liverpool City Council (lead applicant), Meshed, and the University of Wollongong.

Liverpool is one of the largest suburbs in Sydney, home to more than 250,000 residents and a major transport and retail hub. The Council sought to better understand pedestrian volumes and dwell times around its primary rail station and along the key retail corridor connecting to a major regional shopping centre. These insights were critical to evaluating transport upgrades and informing future place making and precinct investment.

By combining camera edge analytics developed by the University of Wollongong with Meshed's LoRaWAN®-based smart device counting solution, Council was able to obtain accurate, privacy-preserving pedestrian data to support planning, investment evaluation and long-term precinct strategy.

Filling a Critical Gap in the Market

By delivering a low-cost, scalable and secure method for measuring how people use space, nCounter filled a clear gap in the market for accurate, fully anonymised people counting data. It removed the barriers of cost, privacy risk and deployment complexity that had previously limited adoption.

> We wanted to create a simple way for cities to get started with IoT. Our Smart Cities Starter Kit provides a pre-configured, low-stress way to deploy a working solution and see data on a dashboard within minutes. With nCounter, we also addressed the need for low-cost people counting - enabling cities to measure pedestrian activity several kilometres from the nearest Wi-Fi network and transmit aggregated counts over LoRaWAN® at a fraction of the cost of traditional systems.
>
> **Andrew Maggio** - *Director Technology & Operations,* Meshed

nCounter addresses portability and power constraints through optional solar deployment, enabling continuous monitoring in locations without access to mains power, with an coverage area of up to 100 metres (328 ft). Crucially, all data is fully anonymised and transmitted using end-to-end encryption, directly addressing privacy and cybersecurity concerns commonly associated with people counting technologies.

Meshed has since supported hundreds of cities and property managers across Australia and South-East Asia, supporting use cases ranging from public parks and active transport corridors to major tourism precincts.

Today, the Meshed nCounter solution delivers accurate occupancy and dwell time analytics across a wide range of applications, including public space management, smart buildings, transport and mobility, tourism, and environmental and cultural assets. It also supports precinct analytics and infrastructure planning-helping organisations move from assumptions to evidence at scale.

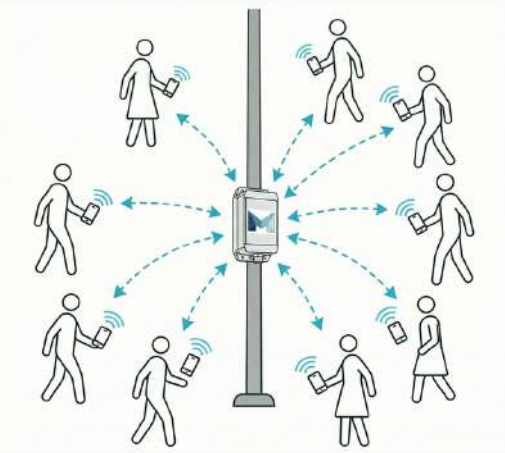
SECTION FOUR

What is nCounter?

Meshed built nCounter to solve a problem that existing technologies had left open: how to count people accurately across wide, open environments, without personal data, or the cost and complexity that had kept reliable usage data out of reach. The result is a purpose-built sensor that turns anonymous wireless signals into decision-grade insight, deployed today across more than 100 cities worldwide.

WHAT IS NCOUNTER?

How it Works



Meshed nCounter is an omni-directional people counting solution that provides accurate foot traffic analytics while preserving individual privacy. The camera-free counting solution provides accurate movement analytics without surveillance concerns.

It estimates the number of people nearby by anonymously detecting Wi-Fi-enabled devices, using smart devices as a proxy for human presence. As the solution is designed to provide full circle coverage, its effective range can vary depending on installation conditions and placement, with potential coverage of up to 360 degrees. For example, a device mounted on a wall may have its coverage reduced to approximately 180 degrees or less.

It is well-suited for public spaces such as railway stations, playgrounds, tourism hotspots, malls, amphitheatres, markets, and events and has been deployed across several cities in the Asia Pacific and US regions. nCounter is a privacy-by-design people counting device that uses passive Wi-Fi signal detection combined with secure LoRaWAN® connectivity to measure footfall without identifying individuals.

All counting and de-duplication occurs locally on the device. The device calculates an aggregated count of Wi-Fi-enabled devices within a configurable time interval (typically between 1 and 15 minutes). No personal data, raw identifiers or device information are stored or transmitted.

At the end of each interval, only the aggregated count is securely transmitted via end-to-end encrypted LoRaWAN® to the cloud platform for reporting and analysis. Immediately after transmission, all transient data held in device memory is erased.

The Wi-Fi sensing zone can be tuned to suit the location, with a typical range between 1 metre to up to 50 metres (3.2 to 165 feet), depending on environmental conditions. Data is visualised through a cloud-hosted dashboard and stored over time to support trend analysis and reporting. The nCounter device connects to a local LoRaWAN network either the public access The Things Network or a private network that can be provided by Meshed. The nCounter WiFi devices will come pre-configured to work with the local LoRaWAN network.

KEY FEATURES

Detection Range

Connectivity up to 60 metres (195 ft), depending on environmental factors

Counting Capacity

Up to 300 unique devices per 10-minute interval

Data Access

Dashboard or API for external system integration

Network

Use the Global LoRaWAN® communications standard via The Things Network or MeshedX LoRaWAN Network.

WHAT IS NCOUNTER?

How Does nCounter Compare with Vision-Based Solutions?

People counting isn't a one-size-fits-all problem. Different environments demand different sensing technologies, and in many cases the best outcomes come from combining them rather than choosing one over another.

Camera-based or AI vision systems may be optimal for security analytics or queue management in places like airports, while low-cost, privacy-safe sensors such as nCounter can provide accurate utilisation and dwell insights for operational tasks like restroom cleaning, precinct activation or maintenance scheduling.

FEATURE	VISION BASED SYSTEM	NCOUNTER COUNTER
PURPOSE	Estimate footfall and dwell behaviour using Wi-Fi-enabled devices as a proxy for people	Count and track individuals using computer vision applied to video frames
DATA PROVIDED	Footfall counts, dwell times, peak periods (population level), heatmaps	Precise counts, trajectories, queue lengths, conversion metrics, potential demographics
BEST USE CASE	Smart cities, parks, precincts, campuses, tourism, transport, events, coastal trails	Retail, airports, stadiums, malls requiring granular performance analytics
PRIVACY AND SIGNAGE	High Privacy Very low risk; no PII; generally no surveillance signage or DPIA required	Low Privacy High exposure; video capture; signage and governance required
CONNECTIVITY	Low-bandwidth LoRaWAN®; no SIMs; no enterprise Wi-Fi; 1 gateway supports many devices	High-bandwidth IP; requires ethernet/Wi-Fi/cellular; may require VMS, NVR, cloud video
POWER / PORTABILITY	Low power; mains or solar; portable; suitable for temporary events and outdoor sites	Requires continuous mains power; typically fixed; not event-portable
INSTALLATION	Fast, non-intrusive; indoor/outdoor; IP-rated; low infrastructure dependency	Complex install; indoor-biased; outdoor requires housings, cabling
DATA STORAGE	Secure cloud SaaS; customer owns data; minimal retention burden	Video storage costs; retention policies; higher compliance overhead
SCALABILITY	High - cost-effective for municipality or multi-site portfolios	Moderate - scaling adds cameras, compute, bandwidth and storage
TOTAL COST OF OWNERSHIP	Low Minimal infrastructure + no SIM + low storage + low compliance	High Hardware + networking + storage + governance + power + support

In short, nCounter delivers the insights that most space, property and precinct managers need - utilisation, dwell, peak periods and comparative trends - without the cost, complexity or privacy burden of camera-based analytics. Choosing the right technology is ultimately about fit-for-purpose outcomes, not just technical capability.

WHAT IS NCOUNTER?

Why LoRaWAN is Well Suited to People Counting

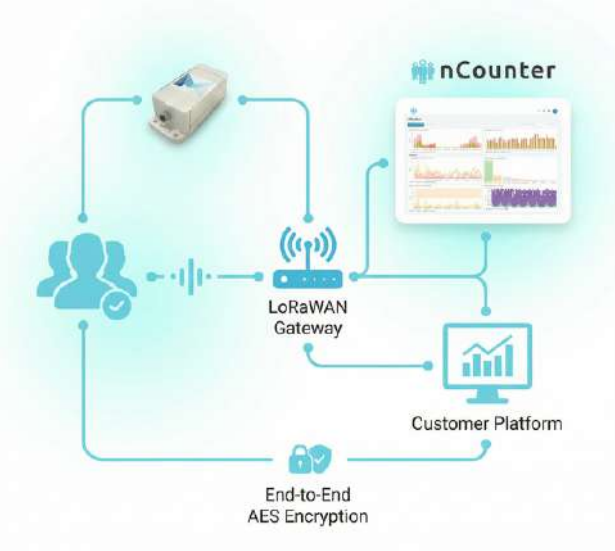
LoRaWAN® enables people counting to be delivered at scale without the cost, power and privacy constraints of traditional technologies.

Because LoRaWAN® is a low-power, low-bandwidth network, nCounter's firmware has been designed to handle low payloads and performs all counting, de-duplication and dwell analysis locally, with only aggregated totals transmitted over encrypted LoRaWAN® links. This architecture enables long-range deployment using battery or solar power - without cameras, mains electricity or high-bandwidth IP networks.

In summary

LoRaWAN® makes people counting affordable, privacy-safe and scalable - enabling organisations to understand how spaces are used and make better planning, operational and investment decisions at a fraction of the cost and risk of traditional approaches.

The result is a solution that is low cost to deploy, simple to scale, and well suited to public and commercial environments. Cities and commercial precinct operators can deploy nCounter at key locations, rapidly access reliable insights, and expand coverage as value is demonstrated.



Zero

SIM cards or cellular charges

Up to 2km / 1.24miles

range of gateway in dense urban environments

can be powered via solar and is highly portable

WHAT IS NCOUNTER?

Who Uses nCounter?

The nCounter people counting solution is used by organisations that require accurate, reliable and privacy-preserving data on how many people are using a space or asset, and how that use changes over time. Typical users include local and state governments, place makers, tourism operators, transport authorities, property owners, precinct managers, planners, and event organisers.

Across cities and regions, people counting is applied to a wide range of public and commercial environments. The table below summarises the primary use-case categories and the benefits delivered by nCounter within each.

CATEGORY	TYPICAL ASSETS / LOCATIONS	KEY BENEFITS
PHYSICAL ASSETS & BUILDINGS	Public and commercial buildings, plazas, shopping centres, trading districts, public amenities and restrooms, community halls, libraries, civic centres	Space utilisation insights, maintenance prioritisation, improved visitor comfort, capacity planning, economic development and leasing support
PUBLIC FOOTPATHS & PEDESTRIAN WALKWAYS	Urban and suburban footpaths, CBD pedestrian routes, pedestrian-only streets, shared zones, laneways, urban connectors, school access routes	Pedestrian safety, capacity and congestion management, maintenance prioritisation, accessibility upgrades
PARKS & OPEN SPACES	Playgrounds, botanic gardens, green corridors, sporting precincts, basketball courts, skate parks, local sports facilities	Asset utilisation insights, cleaning and maintenance optimisation, amenity investment decisions, community health and wellbeing indicators
ACTIVE MOBILITY ASSETS	Shared pedestrian and cycle paths, riverfront and waterfront pathways, cycleways and lanes, walking trails, nature trails, coastal and foreshore paths	Mode-share analysis, peak usage understanding, conflict management, active transport planning, safety improvements, investment justification, emissions-reduction reporting
TRANSPORT ASSETS	Paths to train stations, bus stops (including queue monitoring), light rail and tram access paths, park-and-ride links, ferry terminals and waiting areas	First- and last-mile analysis, transport integration, utilisation management, pedestrian safety and accessibility
ACCESSIBLE PARKING	Accessible parking bays and spaces	Evidence-based space allocation, demand assessment, compliance reporting
TOURISM & VISITOR ATTRACTIONS	Visitor precinct walkways, cultural and arts facilities, museums, galleries, zoos, attraction paths, RV waste disposal facilities	Visitation measurement, dwell-time analysis, experience optimisation, funding and grant justification
EVENTS & TEMPORARY CHANGES	Festivals, markets, local events, road closures, construction detours, temporary access and safety zones	Crowd flow management, safety planning, event evaluation, post-event reporting

SECTION FIVE

Data Provided by nCounter

Counting people is only valuable if the data reaches the right person at the right time in a form they can act on. nCounter is designed not just to sense presence, but to structure that information into clear, continuous insight: who arrived, how long they stayed, when demand peaked, and how patterns shift over days, weeks and seasons. This is where raw signal becomes operational intelligence.

DATA PROVIDED BY NCOUNTER

nCounter Data Shown on Dashboard

nCounter delivers real-time, actionable people counting insights through a highly configurable, cloud-hosted visualisation platform - at a fraction of the cost of traditional systems. Customers retain full ownership of their data, with no lock-in or dependency on proprietary formats.

THE NCOUNTER DASHBOARD PROVIDES STRUCTURED DATASETS INCLUDING:

Detection Range

Total: All devices detected during the current period

New: Devices that appeared in the current period but were not present previously

Current: Devices that remained within range from the previous period

Left: Devices present before but have exited the detection range

Dwell Time Analysis

Tracked per hour, day, month and year. Visualised as histograms showing how long devices stayed in range.

Average Dwell Time

The average time people stay in range. Displayed in configurable time bands (e.g., <10 minutes, 10-20 minutes, 20-40 minutes).

Custom Time Periods

Users can define specific time intervals or use predefined ranges for tailored reporting and insights.

The nCounter solution delivers 24/7, near real-time people counting insights through a secure, cloud-hosted dashboard that is highly visual, intuitive and configurable. Designed for both operational users and decision-makers, the dashboard transforms anonymised movement data into clear, actionable intelligence.

WHAT THE NCOUNTER DASHBOARD SHOWS

- Device locations mapped geographically
- Live footfall counts (people in range)
- People per hour and per day
- Average dwell time and moving dwell-time averages
- Dwell-time histograms to understand visit duration distribution
- Heatmap-style views highlighting periods of high activity
- Data is displayed in hourly blocks, with each hour made up of six 10-minute reporting intervals

DATA PROVIDED BY NCOUNTER

nCounter Dashboard Views

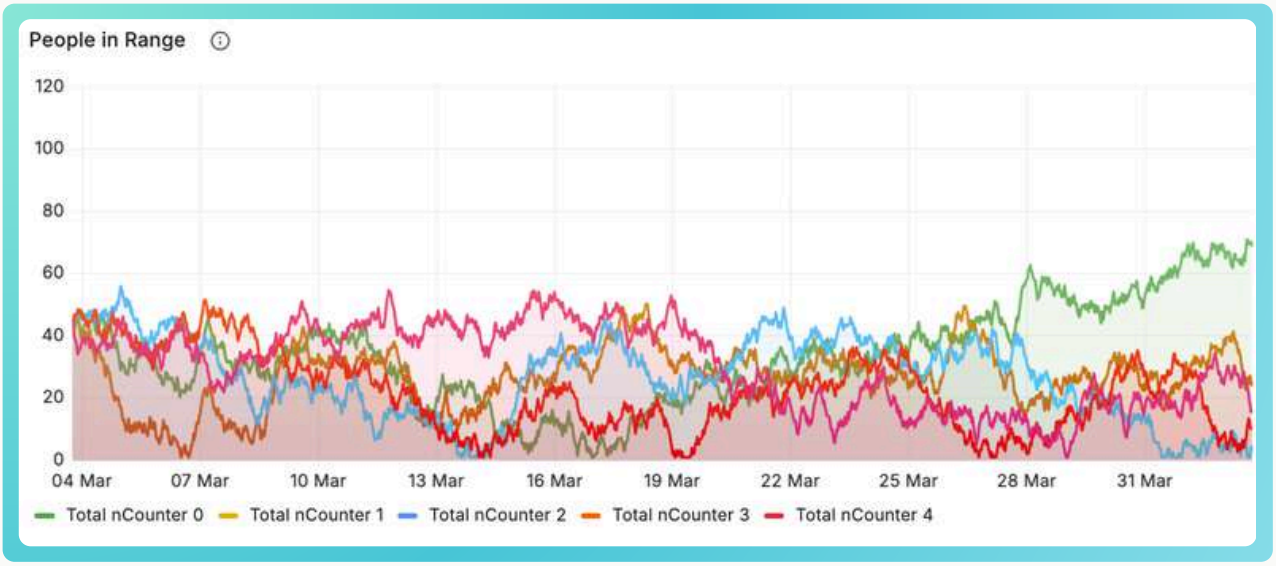


Figure 1: People in range - live footfall counts across multiple nCounter devices over 30 days

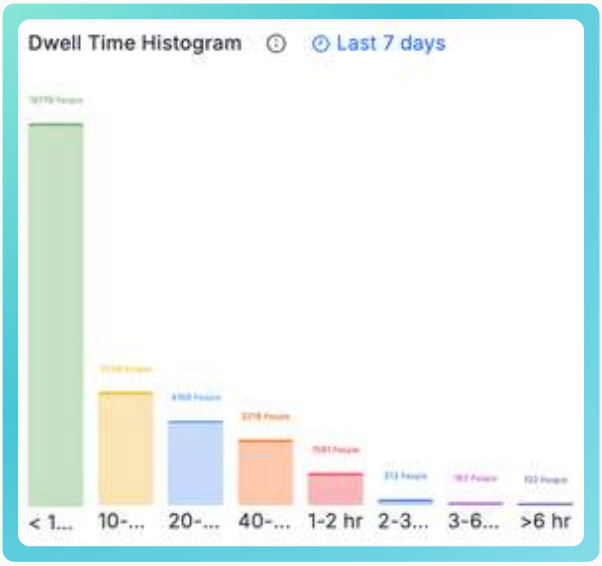


Figure 2: Dwell time histogram - visit duration distribution

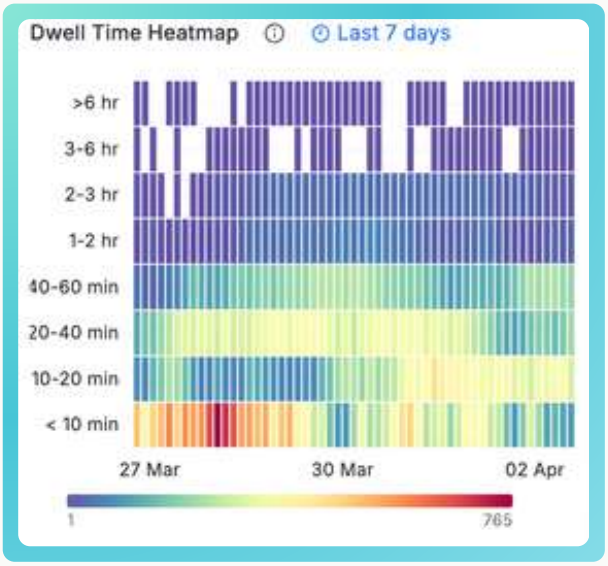


Figure 3: Dwell time heatmap - activity intensity by dwell band and day

The screenshots above illustrate typical nCounter dashboard views and data outputs. Data is displayed in hourly blocks, with each hour made up of six 10-minute reporting intervals - providing timely insight without unnecessary data volume.

DATA PROVIDED BY NCOUNTER

Key Metrics Summary Report

While the nCounter dashboard provides standardised metrics tables and visualisations, the solution also generates key metrics summary reports that interrogate the underlying raw sensor data to deliver a more granular and operationally meaningful understanding of location usage.

METRIC	VALUE	INSIGHT
ANALYSIS PERIOD	22 Dec 2025 – 26 Jan 2026	Continuous dataset across peak holiday period
DATA GAPS	Minimal	Data appears complete and consistent
AVERAGE DEVICES IN RANGE	~113	High baseline occupancy vs previous sites
TOTAL DEVICE COUNTS (CUMULATIVE)	~258,960	Very high aggregate footfall (major destination site)
PEAK DAILY ACTIVITY	~9,840 (Jan 11)	Strong sustained peak during holiday period
MAX INSTANT COUNT	175	No sensor saturation; operating within capacity
MIN INSTANT COUNT	~30	Baseline remains elevated even at low periods
WEEKDAY AVG	~6,928	Strong weekday activity
WEEKEND AVG	~7,884	Noticeable weekend uplift (leisure-driven)
TRUE PEAK FOOT TRAFFIC	Daytime – evening	Clear high-volume visitor pattern
DWELL BEHAVIOUR	~16.7 mins (avg)	Moderate dwell consistent with public destination
DATA STABILITY	High	Clean, reliable dataset with strong continuity

The table above shows an example of the Key Summary Metrics Report that can be generated for each or multiple device locations by the User.

In summary

By standardising these outputs, Key Metrics Summary Reports can be generated automatically across multiple locations, enabling consistent benchmarking and comparative analysis at scale. This allows users to evaluate behavioural patterns, utilisation efficiency, and performance differences across assets within a building, precinct, or city-wide deployment.

DATA PROVIDED BY NCOUNTER

Alerts and Alarms

Using the dashboard alerting function, users can set up alerts by creating an alert rule for the metric they want to monitor. Some relevant examples for nCounter include:

Capacity exceeded

Alert when footfall exceeds a safe capacity number. Supports real-time crowd safety management across public spaces, events and commercial environments.

Low activity detected

Alert when people count drops below a lower threshold, indicating non-peak usage. Enables demand-responsive cleaning, staffing and resource allocation.

Event spikes

Alert on abnormal spikes during events. Provides early warning of unexpected crowd surges that may require operational response or safety intervention.

Sensor offline

Alert when a sensor stops reporting. Ensures data continuity and enables rapid troubleshooting across distributed device networks.

OPERATIONAL AND MAINTENANCE VISIBILITY

A dedicated maintenance panel provides visibility into device and network health. This ensures ongoing performance monitoring and simplifies troubleshooting across distributed deployments.

- **LoRaWAN® signal strength (RSSI)**
  Monitor connectivity quality per device
- **Nearest gateway connection**
  Identify routing and coverage status
- **Latitude and longitude**
  Precise location mapping of each device

DATA PROVIDED BY NCOUNTER

Data Reporting and Integration

All nCounter data is securely stored in the nCounter cloud platform and made available through flexible access options to support operational, analytical and reporting requirements.

AUTHORISED USERS CAN:

View
Real-time and historical insights directly in the nCounter dashboard

Export
Data for offline analysis and reporting in CSV or JSON formats

Integrate
Seamlessly into customer systems - including Power BI, asset management platforms, public dashboards and internal applications - via secure APIs

This flexible approach enables organisations to easily incorporate people counting insights into their existing analytics, planning and operational workflows, ensuring data can be used where it delivers the most value.

REPORTING AND CUSTOMISATION

Users can generate reports using standard or custom time intervals and export data in CSV or JSON formats. Many city customers have seamlessly integrated nCounter data into their open data portals, while others stream data into third-party or internal systems using standard protocols such as HTTPS or MQTT.

SECURE HOSTING

nCounter data is hosted on Meshed's dedicated AWS environment, using government-certified infrastructure to ensure data sovereignty, high availability and redundancy.

CSV JSON REST API HTTPS MQTT Power BI Open data portals

WHY THIS MATTERS

- Reliable, real-time insight into how spaces are used
- Accurate counts without cameras or privacy risk
- Data that supports evidence-based decisions rather than estimates
- Alerts and alarms for just-in-time reporting on mission-critical use cases
- Securely hosted on in-country government certified cloud infrastructure

In short

nCounter turns everyday pedestrian volume data into actionable intelligence, delivered securely, affordably and at scale.

SECTION SIX

nCounter Privacy-by-Design Principles

Public trust is essential for any technology deployed in shared spaces. Where cameras create governance burden and community concern, nCounter was engineered from the ground up to eliminate the collection of personal data entirely. Privacy is not a feature added after the fact. It is the architecture itself, built into every layer from firmware, ensuring that insights never comes at the cost of individual rights.

NCOUNTER PRIVACY-BY-DESIGN PRINCIPLES

Core Privacy Protections

nCounter is a privacy-conscious, passive people-counting solution that detects Wi-Fi probe requests emitted by smartphones in public areas. It has been intentionally designed to deliver accurate footfall insights while ensuring that no information capable of identifying an individual is ever collected, stored or transmitted.

Unlike many cellular- or CCTV-based solutions, nCounter transmits only aggregated device counts. No raw device identifiers, personal data or visual imagery are captured. Meshed does not possess, access or subscribe to any technology capable of linking Wi-Fi MAC addresses to individuals, and nCounter data cannot be reverse engineered to identify a person.

1

Data minimisation and anonymity

No personally identifiable information is collected, stored or transmitted. No names, faces, video footage or user credentials are captured. Individual phones or users cannot be identified or accessed.

2

Passive, local processing

nCounter passively detects Wi-Fi signals without interacting with personal devices. All processing required to calculate counts occurs on the device. Only anonymised, aggregated results are transmitted.

3

No tracking or user interaction

Devices are not tracked across sessions or locations. No repeated-visit recognition, behavioural profiling, registration, login or opt-in is required. nCounter operates silently in the background.

4

Secure transmission and storage

All data is transmitted using end-to-end encrypted LoRaWAN from device to application layer. Aggregated datasets are stored in a secure cloud environment. Customers retain full ownership and control.

5

Device and physical security

Devices have no physical interfaces beyond a power connection. No data can be accessed directly from the device. Hardware is tamper-resistant and designed for secure deployment in public environments.

6

Transparency and accountability

Customers are clearly informed how data is collected, processed and used. Public-sector users can disclose the methodology with confidence, supported by strong, auditable privacy safeguards.

NCOUNTER PRIVACY-BY-DESIGN PRINCIPLES

Compliance with Privacy Regulations

nCounter is designed to align with Australian and international privacy frameworks, including:

AUSTRALIA

Australian Privacy Principles (APPs)

No personal information is collected or processed.

EUROPE

GDPR and ePrivacy Directive

Data is anonymised at the source, avoiding consent and data-subject obligations.

UNITED STATES

CCPA (California)

No consumer data is collected, retained or shared.

GLOBAL FRAMEWORKS

PIPEDA and others

No identifiers are processed in a way that could reasonably re-identify an individual.

Key insight

The result is a people counting solution that delivers accurate, decision-grade insights while remaining fully anonymised, scalable and publicly acceptable - without surveillance, privacy risk or operational complexity.

In summary

nCounter delivers reliable, decision-grade footfall data while removing the privacy, legal and reputational risks associated with personal data collection. Its privacy-by-design architecture makes it well suited to deployment across public spaces, civic precincts and other privacy-sensitive environments.

SECTION SEVEN

Measuring What Matters: How People Counting Drives Performance Across Places and Spaces

Reliable usage data changes more than operations. It changes the quality of every decision an organisation makes about a physical space. It shows where to invest, what to maintain, when to staff, and how to demonstrate that a place is performing. Across government, property, transport, tourism and commercial environments, the organisations deploying nCounter share a common outcome.

Why Organisations Choose nCounter

Across government, property, transport, tourism and commercial environments, the organisations that choose nCounter are solving the same underlying problem: they need accurate, continuous data on how people use their spaces, and they need it in a form that is affordable to deploy, safe to operate in public, and straightforward to act on.

KEY USER BENEFITS

1 Strategic planning, economic development & experience

nCounter provides organisations with reliable, objective insight into how people use spaces and assets, supporting better planning and investment decisions.

- **Councils and government agencies** gain visibility into how public infrastructure is used, enabling evidence-based planning and maintenance prioritisation.
- **Tourism and cultural asset operators** benefit from accurate, low-maintenance visitation data to support destination management.
- **Retailers and trader districts** gain accurate passing footfall data to support local traders and activation initiatives.
- **Commercial building managers** understand occupancy patterns at both building and space level.

2 Cost efficiency & scalability

nCounter is designed to remove the cost, power and infrastructure barriers that typically limit large-scale deployments.

- **Low cost to deploy and operate** enables city-wide rollouts without cameras, SIMs or high-bandwidth networks.
- **Highly scalable by design** supports large, distributed networks from single sites to entire regions.
- **Flexible deployment options** compact, discreet devices with mains or solar power.
- **Lower total cost of ownership** more cost-effective than camera-based alternatives.
- **Fast path to ROI** immediate access to reliable data for planning and operations.

3 Privacy, security & governance confidence

nCounter is designed for public and commercial environments where privacy and trust are critical.

- True anonymisation with no personal data, video or identifiable device information collected or stored.
- Lowest privacy risk compared to camera-based or mobile data solutions
- End-to-end encrypted transmission using LoRaWAN and privacy-by-design architecture
- Supports the shift toward privacy-by-design smart city infrastructure

4 Flexible deployment & harsh environment readiness

Designed to work wherever people move, indoors or outdoors.

- Fast and simple installation, typically completed in around 30 minutes
- Pre-configured devices that begin transmitting data as soon as power is applied
- Portable and relocatable for events, construction projects or seasonal monitoring
- IP67-rated hardware with internal antenna for deep building and urban penetration

5 Long-range, low-power operation

nCounter is designed for public and commercial environments where privacy and trust are critical.

- True anonymisation with no personal data, video or identifiable device information collected or stored.
- Lowest privacy risk compared to camera-based or mobile data solutions
- End-to-end encrypted transmission using LoRaWAN and privacy-by-design architecture
- Supports the shift toward privacy-by-design smart city infrastructure

6 Real-time insights & system integration

nCounter delivers actionable data, not just raw counts.

- Near real-time insights via intuitive online dashboards
- Seamless integration with customer systems and third-party platforms
- Fit-for-purpose datasets focused on planning, operations and reporting

7 Clear return on investment

nCounter enables defensible, data-driven decision-making.

- ROI tracking on infrastructure, placemaking and activation investments
- Asset performance measurement, operational optimisation and long-term planning
- Evidence to support funding applications, grant reporting and business cases

PROVEN AT SCALE

500M+ People counted globally

100+ Cities deployed

In summary

nCounter enables organisations to move from assumptions to evidence-based decision-making, delivering accurate people counting data in a way that is affordable, secure and publicly defensible, making it well suited to use across cities, precincts and public environments.

SECTION EIGHT

Real-Life Case Studies

The clearest evidence to understand what people counting delivers is to look at real results. From a flagship waterfront precinct to a coastal council managing tens of thousands of visitors on New Year's Eve, these deployments demonstrate how continuous, privacy-preserving data transforms planning, operations and investment decisions in environments where traditional approaches had fallen short.

CASE STUDY 01 / GOVERNMENT & SMART CITIES

nCounter at Elizabeth Quay, Perth

Turning 24/7 pedestrian data into actionable insight at Perth's premier waterfront precinct.

CONTEXT

Elizabeth Quay is Perth's flagship waterfront precinct, located in the heart of the CBD between Barrack Street Jetty and William Street. Owned and managed by DevelopmentWA, it is a major commercial, tourism and lifestyle destination. DevelopmentWA has engaged CBRE to deliver facilities management, property management, leasing and economic development services across the precinct, including major commercial assets such as Chevron Tower.

THE CHALLENGE

As a high-profile public precinct, understanding visitor numbers and movement patterns is critical to sustaining economic activity, planning maintenance and operations, managing events and peak visitation, and supporting long-term sustainability. Traditional people counting solutions were either too costly, difficult to deploy at scale, or raised privacy and governance concerns for a public space of this nature.

THE SOLUTION

CBRE worked with the City of Perth to deploy nCounter people counting devices across Elizabeth Quay. nCounter uses passive Wi-Fi sensing combined with LoRaWAN connectivity to deliver real-time, fully anonymised footfall data, without cameras, personal data or high-bandwidth networks. The devices are connected to the City of Perth's public access LoRaWAN network, built on The Things Network and managed by Meshed.

THE OUTCOME

CBRE and the City of Perth have transformed pedestrian movement information into actionable insight, enabling improved maintenance scheduling and asset management, data-driven event planning and precinct activation, clearer understanding of peak visitation and dwell patterns, and evidence-based investment decisions. All of this is achieved without privacy or surveillance risk.

KEY MONITORING LOCATIONS

Island Playground and Water Park • Waterfront promenades and shared paths • Elizabeth Quay Bridge • Barrack Square and Barrack Street Jetty • Hospitality and activation zones • The Bell Tower precinct

CASE STUDY 02 / TOURISM & EVENTS

Major Coastal Toursism Destination - New Year's Eve Fireworks

Managing large-scale coastal events with real-time, privacy-preserving people counting.

70K+	16.2min	7
Visitors counted for the event	Average dwell time within the foreshore zone	nCounter units deployed across viewing areas

CONTEXT

In one of Australia's premier tourism and lifestyle destinations, renowned for its pristine beaches and year-round outdoor lifestyle; on New Year's Eve, large crowds gather across multiple coastal locations to enjoy family-friendly fireworks displays. For New Year's Eve 2026, fireworks were launched from both onshore and offshore locations.

THE SOLUTION

The Council leveraged its extensive public-access LoRaWAN network, managed by Meshed, to deploy seven nCounter units at key beachfront locations associated with the fireworks displays. The devices transmit aggregated footfall data over LoRaWAN, enabling long-range, low-power operation. Data is visualised through both the nCounter platform dashboard and the Council's Power BI environment.

THE CHALLENGE

Managing major coastal events presented several challenges: understanding attendance in real time, managing crowd safety across open beach environments, planning cleaning and amenity servicing, supporting emergency response, and evaluating event success. Traditional methods such as manual counts or CCTV were too slow, costly, or raised privacy concerns in public beach environments.

THE OUTCOME

Real-time data enabled Council to actively monitor crowd volumes during the event, validate public safety strategies, inform post-event servicing, and quantify attendance with confidence rather than estimates. Beyond New Year's Eve, Council has now deployed more than 30 nCounter devices across the region, including mobile sensing trailers at key tourism hotspots.

BROADER REGIONAL IMPACT

Smaller trading districts and shopping precincts · Parking demand and mobility patterns · Future event planning for triathlons, marathons and surf carnivals · Active transport and shared-path infrastructure investment

CASE STUDY 03 / PROPERTY & PRECINCT MANAGEMENT

Riverside Entertainment & Retail Precinct

Long-term, evidence-based insight for one of Australia's most iconic riverfront destinations.

CONTEXT

A major riverside entertainment and retail precinct located minutes from the CBD of a large Australian capital city attracts a diverse mix of locals, tourists, commuters and eventgoers throughout the year. Designed as an eclectic destination with dozens of traders, food venues and live entertainment, the precinct operates across extended hours and supports adjacent ferry services, shared pedestrian and cycling paths, and nearby residential communities.

THE CHALLENGE

Managing a precinct of this scale required accurate, long-term insight into how people moved through and used the space across peak events, seasonal variations and quieter non-trading periods. Precinct operators and the state development authority needed reliable data to support operational planning, maintenance scheduling, event management and future investment decisions, without relying on manual counting, expensive infrastructure or privacy-sensitive technologies.

THE SOLUTION

A privacy-first, LoRaWAN-based people counting solution was deployed across the precinct and surrounding riverfront areas. Low-cost sensors were installed on buildings and light poles using a mix of mains and solar power. The solution delivered fully anonymised, aggregated footfall and dwell-time data to a secure, cloud-hosted dashboard, operating continuously with minimal infrastructure and no impact on customer privacy.

THE OUTCOME

Over multiple years of operation, the solution has provided 24/7 insight into visitor volumes, movement patterns and space utilisation. These insights have supported smarter event planning, improved maintenance efficiency and informed long-term precinct planning around future residential development, hospitality expansion, transport access upgrades and broader revitalisation initiatives.

THE RESULT

Evidence-based decision-making, reduced operational uncertainty and a scalable, privacy-safe approach to understanding how people use complex public spaces.

CASE STUDY 04 / RESIDENTIAL PROPERTY & FACILITIES

Residential Living Developer & Operator

Aligning maintenance, staffing and service delivery to actual usage across premium retirement and resort living communities

20%
Maintenance cost savings achieved by aligning cleaning, servicing and staffing with actual usage patterns

2 flagship properties
Deployed in days, data flowing immediately

CONTEXT

A leading residential property developer and operator specialising in retirement and resort living, residential leasing, student accommodation and specialist disability housing has experienced significant portfolio growth over the past three years. Recognised for innovation in lifestyle-led communities, the organisation has invested heavily in advanced building management systems and sustainability initiatives, earning multiple awards for excellence in urban development.

THE CHALLENGE

As the portfolio expanded, the organisation required deeper, data-driven insight into how shared spaces were being used. This included occupancy, movement patterns and dwell times across cafés and bars, cinemas, wellness and pool areas, dining rooms, lounges, reception spaces, gyms and recreation rooms. Existing approaches lacked the accuracy, scalability and cost-efficiency needed to support operational decision-making.

THE SOLUTION

Meshed deployed nCounter people counting devices alongside motion and indoor air quality sensors across two flagship properties. Indoor LoRaWAN gateways provided reliable coverage across all shared spaces, enabling rapid deployment. Data began flowing within days to Meshed's secure, cloud-hosted dashboard, where facility managers configured tailored dashboards, alerts and reports using a flexible interface.

THE OUTCOME

Access to real-time utilisation data delivered maintenance cost savings of up to 20%, with cleaning, servicing and staffing aligned to actual usage patterns. Operational efficiency improved, while resident experience was enhanced through better resource allocation, ensuring services were deployed where and when residents needed them most.

THE RESULT

Measurable cost savings, improved service delivery, and a scalable, data-driven approach to managing premium residential living environments.

SECTION NINE

The Business Case for People Counting Data

Technology only justifies its cost when it changes decisions. People counting earns its return not by generating revenue directly, but by making visible what was previously invisible: where resources are wasted, where demand is unmet, where investment is justified, and where risk is accumulating unnoticed. A clear business case connects sensing capability to the financial and operational outcomes that matter most.

The Business Case for People Counting Data

The case studies presented in this white paper may not directly mirror your organisation or the type of space you manage. You may not be a local government council or a large property management firm. However, the underlying question remains highly relevant across all sectors: can real-time people counting data deliver measurable value to your operations?

To answer this, it is important to consider people counting not as a standalone technology, but as a decision-support tool. When supported by a clear business case that defines costs, objectives and expected outcomes, people counting data becomes a powerful enabler of operational efficiency, planning confidence and improved asset performance.

At its core, people counting systems convert human presence and movement into measurable, actionable insights about how a space is used.

Increasingly, facilities and asset managers are shifting away from rigid, time-based maintenance models towards predictive and condition-based approaches. People counting data supports this shift by aligning maintenance, cleaning, staffing and operational activity with real demand.[9]

At its core, people counting systems convert human presence and movement into measurable, actionable insights about how a space is used. Regardless of the sensing method, the value lies in replacing assumptions with evidence.

THE FOUR COMPONENTS OF A COMPREHENSIVE BUSINESS CASE

A complete people counting business case typically includes four core components. Together, these define the problem, identify the value, validate the technology fit, and measure the return.

1 PROBLEM DEFINITION

Where are decisions currently being made without evidence? What costs, risks or missed opportunities exist due to lack of data?

2 VALUE DRIVERS

Cost reduction (cleaning, staffing, maintenance), revenue uplift (retail, leasing, tourism, events), risk reduction (safety, compliance, crowd management), and capital efficiency.

3 TECHNOLOGY FIT

Non-camera vs camera-based (privacy, cost, governance). Temporary vs permanent deployments. Cost to install and scale. Integration with existing systems.

4 ROI MEASUREMENT

Define success metrics upfront: cost savings achieved, revenue uplift or avoided spend, improved utilisation or safety outcomes, time to payback (typically 6 to 18 months).

Sector-specific ROI examples

To illustrate how a return-on-investment business case can be applied in practice, the table below presents sector-specific examples across both public and private organisations. These examples demonstrate how people counting systems, including privacy-preserving LoRaWAN solutions such as nCounter, can deliver measurable financial and operational benefits by enabling data-driven decision-making.

SECTOR	PRIMARY DRIVERS FOR ROI	USE CASES	TYPICAL PAYBACK
PHYSICAL ASSETS & BUILDINGS *Public spaces, precincts & infrastructure*	15 to 30% reduction in contractor and labour costs, better capital expenditure allocation, grant and funding justification, safety and risk reduction, event and crowd management	Footpaths, parks, foreshore areas, libraries, town centres, events and public amenities. Permanent sensors and portable units for events	**6 TO 12 MONTHS** Often faster across multiple assets
TOURISM OPERATOR *Attractions, destinations & events*	Improved visitor yield, commercial retail attraction, operational efficiency in staffing and amenity management, customer experience optimisation, event performance measurement for funding and sponsorships	Visitor precincts, attractions, museums, art galleries, beaches, cultural sites, festivals and seasonal events	**ONE PEAK SEASON** Often recovers full deployment cost
RETAIL PRECINCT *Main streets, shopping centres, trader associations*	Tenant sales uplift, leasing value justification, conversion rate visibility, trader support, customer experience, marketing and events, design and layout changes	CBDs, strip retail, shopping centres, mixed-use precincts. Sensors at entrances, corridors and high-footfall zones	**3 TO 9 MONTHS** Driven by leasing and retail performance
COMMERCIAL BUILDING *Office, mixed-use, corporate campuses*	10 to 25% reduction in facilities operating costs, space utilisation insights, leasing and tenant attraction, 10 to 20% energy savings without major capital upgrades	Office precincts, plazas, lobbies, shared amenities, food halls, end-of-trip facilities. Sensors at building entries, floors and shared spaces	**6 TO 18 MONTHS** Faster with HVAC and BMS integration

Sources: This RoI table metrics was derived using a combination of Meshed research and key insights derived frm JLL Global Occupany Planning Benchmark Report.[10]

Based on a growing body of industry research and benchmarking reports, the shift towards data-driven decision-making, enabled by advanced sensor technologies integrated with building and asset management systems, has become increasingly critical for understanding space utilisation and performance.[11]

This is particularly relevant in the commercial sector, where organisations continue to adapt to hybrid work models, variable occupancy patterns and mandated in-office days.

In this context, people counting delivers return on investment because it fundamentally changes how decisions are made. When staffing, maintenance, investment and activation strategies are aligned with actual patterns of human behaviour, organisations consistently achieve financial and operational benefits that outweigh the cost of the technology.

In summary

Technology only justifies its cost when it changes decisions. People counting earns its return not by generating revenue directly, but by making visible what was previously invisible: where resources are wasted, where demand is unmet, where investment is justified, and where risk is accumulating unnoticed. A clear business case connects sensing capability to the financial and operational outcomes that matter most.

TRUSTED BY LEADING PUBLIC AND PRIVATE ORGANISATIONS

SECTION TEN

Why nCounter is the Right Choice

Across every criterion that determines whether a people counting deployment succeeds at scale, the same requirements surface: privacy without compromise, cost without complexity, data without delay, and confidence without surveillance. nCounter was designed to meet all four, and has proven that capability across more than 100 cities, and 500 million people counted.

Why nCounter is the right choice

nCounter has emerged as a trusted LoRaWAN-based people counting solution for cities, precincts and commercial operators, proven to deliver real-time insight at scale through five defining attributes.

Privacy-first by design

Built for public and commercial environments. nCounter collects no personal or identifiable data. All insights are fully anonymised, ensuring public acceptance and regulatory alignment.

Deploy anywhere, anytime

Indoor and outdoor environments, mains or solar power, deep indoor penetration, long-range LoRaWAN. Portable for temporary deployments, events and evolving precincts.

Scalable and cost-effective

No SIM cards or cellular fees. Low total cost of ownership. Scales effortlessly across large portfolios, ideal for councils, precinct managers and property owners.

24/7 actionable insights

Secure cloud-hosted dashboard with continuous visibility into visitation volumes, dwell times, peak periods and long-term trends. Integrates seamlessly into BI, asset management and reporting platforms.

Enterprise-grade security

End-to-end encryption from device to application layer, ensuring secure, trusted delivery of insights without compromising privacy or operational integrity.

PROVEN AT SCALE

nCounter supported us with event attendance estimation for a regional WA surf event. The setup was straightforward, and once installed, the device was effective in capturing attendance data at the central event location. The seamless integration between the device and the gateway made setup easy, and the device performed reliably even in areas with limited network coverage. Live data transmission via the dashboard also enabled us to monitor attendance throughout the event period.

Abhinav Gupta - Account Manager, Metrix Consulting

SECTION ELEVEN

Frequently Asked Questions

Deploying any new technology into a public or commercial environment raises practical questions about capability, compliance, integration and cost. The questions below address the most common areas of enquiry from organisations evaluating people counting for the first time, as well as those expanding existing deployments.

Frequently Asked Questions

Answers to the questions most often raised by cities, precinct managers and property teams.

PRIVACY, DATA & COMPLIANCE

9 Questions

What is nCounter?

A privacy-first people counting solution providing near real-time insight into how many people use a space, how long they stay and when peak periods occur. Replaces manual counts and assumptions with data.

How does it protect privacy?

Custom Meshed firmware that does not rely on MAC addresses. It analyses multiple non-identifiable characteristics of Wi-Fi probe requests. Randomised MACs are discarded immediately, nothing identifiable is stored, all processing is transient and anonymised.

Is signage or notification required?

Because nCounter captures no PII, video or identifiable device data, it is widely accepted in public spaces without surveillance signage. It is no different to a passive air quality or motion sensor, which do not require signage.

What data does it provide?

- Total people in range
- New arrivals and people currently present
- People who have left
- Average and moving-average dwell time
- Dwell time histograms

Viewable hourly, daily, monthly or custom.

Does it collect personal data?

No. nCounter does not collect names, phone numbers, MAC addresses, images, video or any PII. It produces only aggregated, anonymised counts, making it privacy-safe by design.

Is nCounter GDPR compliant?

Yes, by design. It adheres to GDPR principles including data minimisation, purpose limitation and privacy-by-design. No personal data is collected, processed or stored at any stage.

How does it count people?

It estimates footfall by anonymously detecting Wi-Fi probe requests broadcast by smartphones. Firmware aggregates counts in 10-minute intervals and transmits only totals via LoRaWAN to the dashboard.

How accurate is the data?

How accurate is the data? nCounter delivers decision-grade accuracy suitable for operational planning, benchmarking and comparative analysis. Accuracy depends on placement, range configuration and environment, all of which Meshed supports during deployment and optimisation.

Is Wi-Fi a reliable proxy for people counting?

Wi-Fi detection is a widely accepted proxy for understanding pedestrian presence and trends in public and commercial environments. nCounter improves accuracy by analysing multiple non-identifiable signal characteristics rather than relying on MAC addresses alone. People without Wi-Fi-enabled devices, such as young children, may not be directly detected, however smartphone penetration in public spaces is very high. nCounter is designed to measure patterns, trends and relative change, not identify individuals, making it highly reliable for planning and decision-making over time

Deployment & Commercial

Practical answers for teams planning or scoping an nCounter deployment.

DEPLOYMENT, INTEGRATION & COMMERCIAL

9 Questions

What infrastructure is required?

- Power (mains or optional solar)
- Mount point plus elevated gateway location
- LoRaWAN connectivity either via existing network or new low-cost gateway for location

No SIMs, no customer IP network, no high-bandwidth connectivity required.

What are the solution components?

- nCounter device installed on site
- Cloud-hosted dashboard and reporting
- LoRaWAN connectivity via a gateway

The nCounter Special Offer includes all three components out of the box.

How difficult is installation?

Simple and non-intrusive. Mount the device, connect power, confirm LoRaWAN connectivity and check the dashboard. Most installations take minutes, with data visible within 3 to 10 minutes of power-up.

Outdoors and temporary events?

Yes. nCounter is IP67-rated, supports solar power and is portable, making it ideal for outdoor locations, pop-up events, festivals and temporary studies. The LoRaWAN gateway can also be moved as required.

Integration with existing systems?

- View in the nCounter dashboard
- Export by authorised users
- Integrate via secure APIs into Power BI, asset management, digital twins, portals

Who owns the data?

Customers own their data and the hardware. Data can be exported at any time. Meshed provides the platform and support under a licence-to-use model, ensuring security, continuity and system maintenance.

FCC and RCM approvals?

Yes. nCounter devices are fully certified.

- FCC approval for international and US deployments
- RCM approval for Australia and NZ

What about smartphone penetration?

While individuals without Wi-Fi-enabled devices, such as young children, may not be directly detected, the algorithm accounts for high smartphone penetration rates across the population. nCounter focuses on measuring patterns and trends rather than identifying individuals.

What is the pricing model?

Subscription-based. Hardware is a one-off capital purchase. An annual subscription covers device maintenance, dashboard access, data storage and LoRaWAN connectivity. Significantly more cost-effective at scale than camera or cellular solutions, with no SIM cards and strong economies of scale as additional devices are deployed across portfolios.

Endnotes

1 Global People Counting Systems Market Size: valued at USD 1.46 billion in 2025. The market is projected to grow from USD 1.66 billion in 2026 to USD 4.69 billion by 2034, exhibiting a CAGR of 13.89% during the forecast period. https://www.fortunebusinessinsights.com/people-counting-system-market-105998

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5 XY Sense. (2024). Global Workplace Utilisation Index. XY Sense Workplace Analytics. https://xysense.com/workplace-utilization-index/

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8 Australian Federal Government's Smart Cities and Suburbs Program. https://www.pmc.gov.au/sites/default/files/reports/publications/annual_reports/2016-17-HTML/content/smart-cities-and-suburbs-program-and-future-ready-initiatives.html

9 Quantifying the suitability and feasibility of predictive maintenance approaches. Authors: N.N.A. Silveira a, A.A. Meghoe a, T. Tinga a b

10 Global Occupancy Planning Benchmark Report 2025 – JLL. https://www.jll.com/en-us/insights/occupancy-benchmark-report

11 Predictive Maintenance Transforming FM with AI by Dave Hopson. https://fmj.ifma.org/predictive-maintenance

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