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IoT forecast: assumptions, definitions and methodology

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RESEARCH

IoT forecast: historical data and forecasts for 1247 metrics in 84 countries

DataHub

Figure 1: Key IoT metrics

FORECAST COVERAGE

Technologies

Technologies:

- 2G
- 3G/4G
- 5G
- NB-IoT
- LTE-M
- Other LPWA (includes Sigfox, LoRa etc)
- Fixed (selected applications with a dedicated fixed connection)

Geographical

Countries and regions:

- 84 countries (1247 metrics per country)
- 8 regions

Verticals/applications

- **Agriculture** (cattle, forest, irrigation)
- **Automotive** (fleet HGV, fleet LCV, embedded, aftermarket)
- **Finance** (ATMs)
- **Health** (chronic RPM, acute RPM, PERS)
- **Industry** (heavy equipment, gas/oil pipelines, machine tools, warehouse management).
- **Retail** (in-store, roadside, temporary, transit hub, public venue signage, PoS, vending machines)
- **Smart building** (security alarms, security cameras, smoke alarms, white goods)
- **Smart cities** (CCTV, parking, streetlights, waste bins)
- **IoT tracking** (bicycles, people, cylinders, high value assets, pets, skips)
- **Utilities** (electric, dual-fuel, gas and water meters, water pipelines, smart grid)
- **Miscellaneous**

Metrics

CONNECTIONS[1]

- Connections by technology (country market total)
- Connections by sector/application by country market

REVENUE

Service revenue by technology

- Total value chain (TVC) revenue for 2G, 3G/4G, 5G, NB-IoT, LTE-M, other LPWA

Service revenue for total cellular, LPWA and fixed (selected applications)

- TVC segmented by hardware (communications, device, installation), connectivity service and application

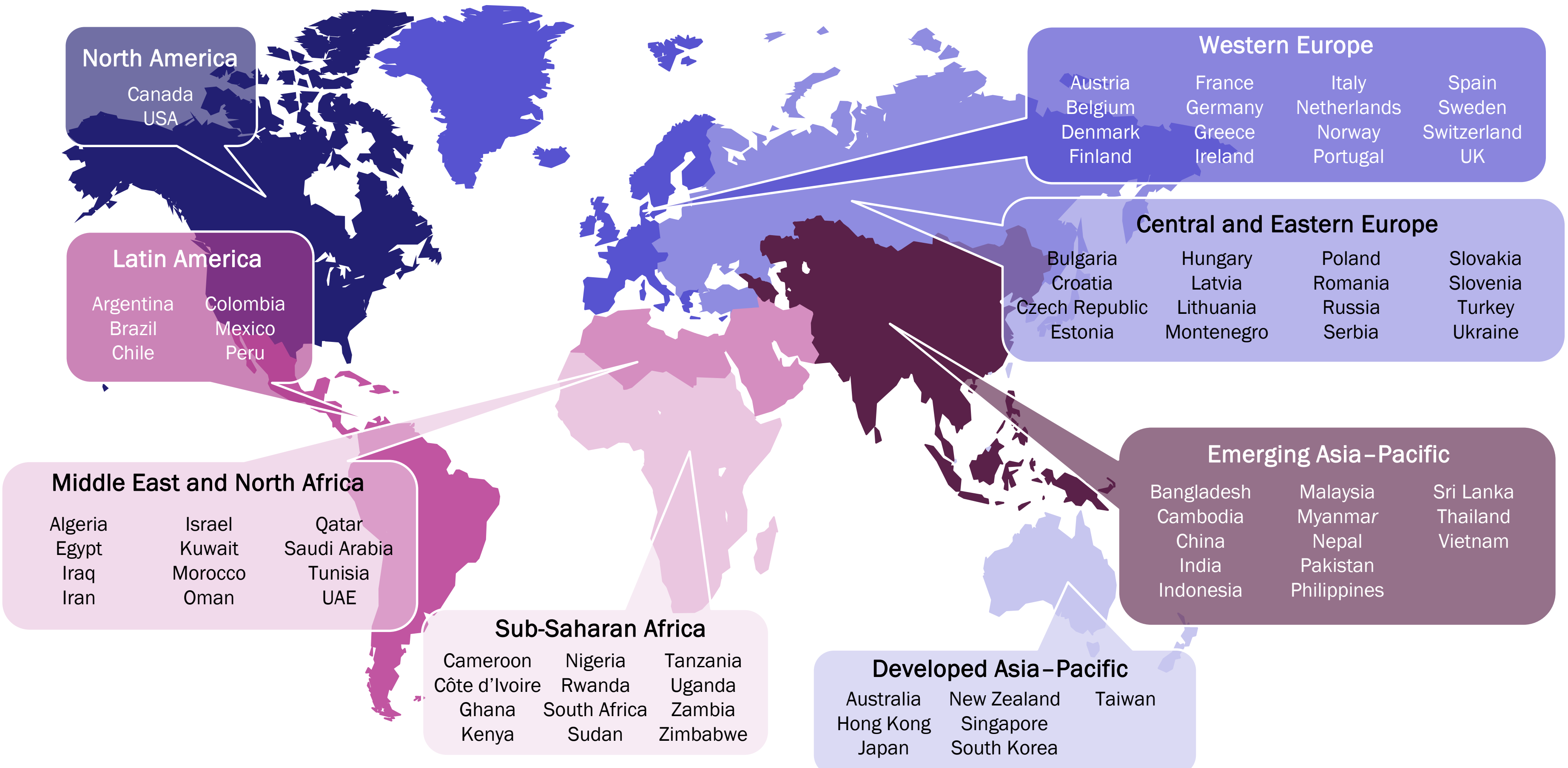
Service revenue by sector/application

- TVC segmented by hardware (communications, device, installation), connectivity service and application
- ARPC for cellular and LPWA
- Total blended ARPC for connectivity service only

[1] Wireless IoT (M2M) connections are typically unattended SIMs communicating with each other. Includes both cellular and LPWA connections. Excludes all mobile-broadband connections.

IoT geographical coverage: more than 80 countries in 8 regions; regional totals and worldwide results are included

Figure 2: Geographical coverage of Analysys Mason's IoT forecast



IoT connections base data and assumptions [1/9]

Figure 3a: IoT base data and assumptions, by application

Vertical	Application	Base data	Industry data	Key assumptions	Drivers
Agriculture	Cattle tracking	Food and Agriculture Organisation (UN) data	▪ Public connectivity contracts in agriculture (by operators and agricultural providers) ▪ Research interviews	Penetration and adoption of connected devices for cattle tracking	Business drivers (e.g. competitive advantage, cost efficiencies and productivity gains)
Agriculture	Forestry	Food and Agriculture Organisation (UN) data	▪ Public connectivity contracts in agriculture (by operators and agricultural providers) ▪ Research interviews	Penetration and adoption of connected devices for forestry tracking (e.g. smoke/fire alerts)	Business drivers (e.g. competitive advantage, cost efficiencies and productivity gains)
Agriculture	Irrigated land	Food and Agriculture Organisation (UN) data	▪ Public connectivity contracts in agriculture (by operators and agricultural providers) ▪ Research interviews	Penetration and adoption of connected devices for irrigated land (e.g. soil condition monitoring)	Business drivers (e.g. competitive advantage, cost efficiencies and productivity gains)
Automotive	Embedded	OICA passenger car sales	▪ Operators' connected car contracts ▪ Vehicle manufacturers' announcements ▪ Research interviews	▪ Replacement rates for passenger cars ▪ Growth in the number of car sales ▪ Embedded SIM penetration	▪ Macroeconomic drivers (e.g. GDP and economic output) ▪ Government policy (e.g. eCall and subsidies) ▪ Technology innovation

IoT connections base data and assumptions [2/9]

Figure 3b: IoT base data and assumptions, by application

Vertical	Application	Base data	Industry data	Key assumptions	Drivers
Automotive	Aftermarket	OICA passenger cars in use	▪ Operators' telematics contracts ▪ Telematics providers' data (e.g. TomTom data) ▪ Research interviews	Penetration and adoption of aftermarket passenger car services	▪ Socioeconomic drivers (e.g. car theft and road safety) ▪ Government policy (e.g. eCall) ▪ Insurance requirements
Automotive	Fleet HGV	OICA commercial vehicles in use and ACEA HGV and LCV data	▪ Operator data ▪ Fleet management provider data ▪ Research interviews	Penetration and adoption of fleet management service by country	Business drivers (e.g. competitive advantage, cost efficiencies and productivity gains)
Automotive	Fleet LCV	OICA commercial vehicles in use and ACEA HGV and LCV data	▪ Operator data ▪ Fleet management provider data ▪ Research interviews	Penetration and adoption of fleet management service by country	Business drivers (e.g. competitive advantage, cost efficiencies and productivity gains)
Finance	ATMs	IMF ATM data and various country-level sources	▪ Banking data ▪ Research interviews	▪ ATM penetration for markets where data is not available ▪ Penetration and adoption of ATMs supported by fixed and cellular technology	Maturity of the banking sector

IoT connections base data and assumptions [3/9]

Figure 3c: IoT base data and assumptions, by application

Vertical	Application	Base data	Industry data	Key assumptions	Drivers
Healthcare	RPM (chronic)	WHO hypertension data	▪ Public contracts on RPM adoption ▪ Research interviews	▪ Chronic disease prevalence for markets where data is not available ▪ Penetration and adoption of RPM devices supported by fixed and cellular technology	Public and private healthcare business drivers e.g. patient outcomes, cost efficiencies and productivity
Healthcare	RPM (acute)	Hospital admissions data	▪ Public contracts on RPM adoption ▪ Research interviews	▪ Hospital admissions for markets where data is not available ▪ Penetration and adoption of RPM devices supported by fixed and cellular technology	Public and private healthcare business drivers e.g. patient outcomes, cost efficiencies and productivity
Healthcare	Personal Emergency Response System (PERS)	UN population data by age 65+	▪ Public PERS contracts and/or volumes of devices sold ▪ Research interviews	Penetration and adoption of PERS devices supported by fixed and cellular technology	Public and private healthcare business drivers e.g. patient outcomes, cost efficiencies and productivity
Industry	Heavy equipment (construct-ion)	Euromonitor's construction data	Research interviews	Penetration and adoption of heavy equipment monitoring devices supported by cellular technology	Business drivers e.g. cost efficiencies and new service models

IoT connections base data and assumptions [4/9]

Figure 3d: IoT base data and assumptions, by application

Vertical	Application	Base data	Industry data	Key assumptions	Drivers
Industry	Pipelines	CIA World Factbook: pipeline length	Desk research	Penetration and adoption of pipeline monitoring devices supported by cellular technology	Oil and gas industry drivers e.g. cost efficiencies and theft/tampering detection
Industry	Machine tools	Analysys Mason's estimates based partly on Gardner Business Media data	Public contracts on IoT/connectivity for machine tools	Penetration and adoption of devices for machine tool location/monitoring	Manufacturing drivers e.g. cost efficiencies, reduce loss/theft and increase productivity
Industry	Warehouse asset tracking	Analysys Mason enterprise sites	Desk research	Penetration and adoption of devices for warehouse asset tracking	Manufacturing drivers e.g. cost efficiencies, reduce loss/theft and increase productivity
Logistics and tracking	Bicycles	Euromonitor's bicycle possession by household data	Analysys Mason estimates based on public contracts and research interviews	Penetration and adoption of devices to track bicycles	Business drivers e.g. connectivity is the foundation of bike sharing schemes, reduce costs, loss and theft
Logistics and tracking	Cylinders	Analysys Mason's number of households data	▪ Cylinder company sources e.g. Air Liquide, Linde ▪ Research interviews	Penetration and adoption of cylinder tracking/monitoring devices	Logistics drivers e.g. cost efficiencies and reducing number of deliveries
Logistics and tracking	High-value assets	Various	Analysys Mason's estimates based on public contracts and research interviews	Penetration and adoption of connected devices to monitor assets	▪ Business drivers e.g. differentiate products based on connectivity and new features ▪ Possible insurance use cases

IoT connections base data and assumptions [5/9]

Figure 3e: IoT base data and assumptions, by application

Vertical	Application	Base data	Industry data	Key assumptions	Drivers
Logistics and tracking	People	UN population data by age	Analysys Mason's estimates based on public contracts and research interviews	Penetration and adoption of devices to track children	Business drivers e.g. differentiate products, new features and meet consumer need for safety and security
Logistics and tracking	Pets	Euromonitor's pets per household data	Analysys Mason's estimates based on public contracts and research interviews	Penetration and adoption of devices to track pets	Business drivers e.g. differentiate products and new features
Logistics and tracking	Skips	Analysys Mason's number of households data	▪ Analysys Mason's estimates based on publicly available contracts and research interviews ▪ Company sources and estimates on skip usage	Penetration and adoption of devices to track skips	Business drivers e.g. cost efficiencies and planning of skip collection (collect when full)
Retail	Digital signage	Outdoor Advertising Association of America (OAAA) and advertising companies e.g. JC Decaux data on number of sites	Analysys Mason's estimates based on publicly available contracts and research interviews	▪ Penetration and adoption of digital signage for various scenarios. ▪ Estimates of fixed and cellular technology support	Business drivers e.g. cost efficiencies

IoT connections base data and assumptions [6/9]

Figure 3f: IoT base data and assumptions, by application

Vertical	Application	Base data	Industry data	Key assumptions	Drivers
Retail	PoS terminals	▪ Bank for International Settlements (BIS) PoS data by country and Analysys Mason's estimates ▪ Euromonitor's number of retail outlets data	Analysys Mason's estimates based on publicly available contracts and research interviews	▪ Penetration and adoption of PoS ▪ Estimates of fixed and cellular technology support	Business drivers (e.g. cost efficiencies)
Retail	Vending machines	Analysys Mason's estimates based on publicly available data on number of vending machines	Analysys Mason's estimates based on public contracts and research interviews	Penetration and adoption of devices to monitor vending machines	Business drivers (e.g. inventory management and cost efficiencies)
Smart buildings	Security alarms	Analysys Mason's number of households and enterprise data by country	Industry organisation estimates on penetration of residential security alarms	Penetration and adoption of professionally monitored and DIY security alarms	Business and residential drivers (e.g. protect assets and reduce theft)
Smart buildings	Security cameras	Analysys Mason's number of households and enterprise data by country	Industry and publicly available estimates of CCTV penetration	Penetration and adoption of security cameras for private use	Business and residential drivers (e.g. protect assets and reduce theft)
Smart buildings	Smoke alarms	Analysys Mason's number of households and enterprise data by country	▪ Industry and publicly available data ▪ Research interviews	Penetration and adoption of smoke alarms	▪ Business drivers (e.g. safety, product differentiator) ▪ Building regulation compliance and insurance

IoT connections base data and assumptions [7/9]

Figure 3g: IoT base data and assumptions, by application

Vertical	Application	Base data	Industry data	Key assumptions	Drivers
Smart buildings	White goods	Euromonitor's household possession of white goods	Research interviews	Penetration and adoption connected white goods	Business drivers
Smart cities	CCTV	Analysys Mason's estimates based on publicly available data points on number of CCTV cameras or penetration by country	Analysys Mason's estimates based on publicly available data points on number of CCTV cameras or penetration by country	Penetration and adoption of connected security cameras for public use	Government drivers (e.g. public safety and crime prevention)
Smart cities	Parking	Industry organisation data (e.g. European Parking Association) and Analysys Mason's estimates based on public sources	Industry organisation data e.g. European Parking Association and Analysys Mason's estimates based on public sources.	Penetration and adoption of connected parking spaces	Government drivers (e.g. cost efficiencies, reduce traffic congestion and maximise revenue)
Smart cities	Streetlights	▪ World Bank land area data by country ▪ Euromonitor km of road per km^2 of land	▪ Analysys Mason's estimates based on publicly available data points on number of streetlights by country/city ▪ Public contracts on connected streetlights and upgrades to LED	Penetration and adoption of connected streetlights	Government drivers (e.g. cost efficiencies, reduce operational costs and energy bills)

IoT connections base data and assumptions [8/9]

Figure 3h: IoT base data and assumptions by application

Vertical	Application	Base data	Industry data	Key assumptions	Drivers
Smart cities	Waste management	Analysys Mason's estimates based on publicly available data points on waste management	Analysys Mason's estimates based on publicly available data points on waste management	Penetration and adoption of connected bins	Government and contractor drivers (e.g. cost efficiencies)
Utilities	Electric meters	Government data on smart meter policy and deployment	▪ Utility company data on smart meter deployment ▪ Research interviews	Penetration and adoption of smart meters supported by cellular and LPWA technology	Government and business drivers (e.g. energy efficiencies and cost efficiencies)
Utilities	Dual fuel meters	Government data on smart meter policy and deployment	▪ Utility company data on smart meter deployment ▪ Research interviews	Penetration and adoption of smart meters supported by cellular and LPWA technology	Government and business drivers (e.g. energy efficiencies and cost efficiencies)
Utilities	Gas meters	Government data on smart meter policy and deployment	▪ Utility company data on smart meter deployment ▪ Research interviews	Penetration and adoption of smart meters supported by cellular and LPWA technology	Government and business drivers (e.g. energy efficiencies and cost efficiencies)
Utilities	Water meters	Government data on smart meter policy and deployment	▪ Utility company data on smart meter deployment ▪ Research interviews	Penetration and adoption of smart meters supported by cellular and LPWA technology	Government and business drivers (e.g. energy efficiencies and cost efficiencies)

IoT connections base data and assumptions [9/9]

Figure 3i: IoT base data and assumptions, by application

Vertical	Application	Base data	Industry data	Key assumptions	Drivers
Utilities	Water pipelines	Utility company data on water pipeline deployment	▪ Utility company data on water pipeline deployment ▪ Research interviews	Penetration and adoption of connected pipelines	Government and business drivers (e.g. management of scarce resource and cost efficiencies)
Utilities	Smart grid	Utility company data on smart grid	▪ Utility company data on smart grid ▪ Research interviews	Penetration and adoption of smart grid/connected grid	Government and business drivers (e.g. load balancing, energy efficiencies and cost efficiencies)

IoT forecast definitions [1/7]

Figure 4a: IoT definitions, by application

Vertical	Application	Definition
Agriculture	Cattle tracking	Wireless IoT connections deployed in monitoring the location and well-being of livestock.
Agriculture	Forestry	Wireless IoT connections deployed in forestry. Connectivity is used to provide information on location, temperature, smoke and wind direction to help prevent and fight fire or illegal logging.
Agriculture	Irrigated land	Wireless IoT connections deployed in irrigation. Connectivity is used to monitor and optimise irrigation and water levels by measuring tank and flow levels and water pump status and power.
Automotive	Embedded	Wireless IoT connections deployed embedded in passenger cars. Embedded connectivity is defined as a modem and SIM card embedded into the vehicle during construction.
Automotive	Aftermarket	Wireless IoT connections deployed aftermarket in passenger cars. Aftermarket modular connectivity is defined as a modem and SIM fitted in the aftermarket, either professionally installed or using the OBDII port.
Automotive	Fleet HGV	Wireless IoT connections deployed in fleet management for heavy good vehicles (HGVs). Fleet management solutions enable businesses to track and monitor vehicles and/or drivers in real time. Applications include route optimisation, driver behaviour monitoring, fuel consumption, stolen vehicle recovery and mobile workforce. HGVs are typically vehicles of more than 3.5 tonnes.
Automotive	Fleet LCV	Wireless IoT connections deployed in fleet management for light commercial vehicles (LCVs). Fleet management solutions enable businesses to track and monitor vehicles and/or drivers in real time. Applications include route optimisation, driver behaviour monitoring, fuel consumption, stolen vehicle recovery and mobile workforce. LCVs are typically vehicles of less than 3.5 tonnes.
Finance	ATMs	Wireless IoT connections deployed in automated teller machines (ATMs). For ATMs, connectivity is built into the ATM to enable real-time financial transactions.
Healthcare	RPM (acute)	Wireless IoT connections deployed in RPMs for patients with acute conditions (acute remote patient monitoring). Connected medical devices that are used to measure and monitor acute conditions of a patient remotely and transmit results to a healthcare provider.
Healthcare	RPM (chronic)	Wireless IoT connections deployed in RPMs for patients with chronic conditions (chronic remote patient monitoring). Connected medical devices that are used to measure and monitor chronic conditions of a patient remotely and transmit results to a healthcare provider.

IoT forecast definitions [2/7]

Figure 4b: IoT definitions, by application

Vertical	Application	Definition
Healthcare	Personal Emergency Response System (PERS)	Wireless IoT connections deployed in PERS. Connected devices used by senior citizens and vulnerable adults to provide an emergency response and location service.
Industry	Heavy equipment	Wireless IoT connections deployed in heavy equipment. Employed to monitor location, diagnostics and usage of construction equipment including applications for cranes, dump trucks, bulldozers and tractors.
Industry	Pipelines	Wireless IoT connections deployed in gas/oil pipelines. Employed to monitor pressure calibration in the pipeline transport network and ensure that the correct level of compression is used to propel the oil and gas along the pipelines. They are also used to detect leaks/theft.
Industry	Machine tools	Wireless IoT connections deployed in machine tools. LPWA connectivity is used to track machine tools to monitor location and possibly usage parameters. These could include tools within a warehouse, as well as hire tools leased to other stakeholders.
Industry	Warehouse asset tracking	Wireless IoT connections deployed in warehouse management. LPWA connectivity is used to track inventory in warehouses to provide location data and allow for more-efficient management of warehouse space.
Logistics and tracking	Bicycles	Wireless IoT connections deployed in tracking bicycles.
Logistics and tracking	Cylinders	Wireless IoT connections deployed in tracking cylinders. LPWA connectivity is used to track the location or fill levels of gas/liquid cylinders to increase refill efficiencies.
Logistics and tracking	High-value assets	Wireless IoT connections deployed in tracking high-value assets. Used to track vehicles, luggage, parcels and cargo.

IoT forecast definitions [3/7]

Figure 4c: IoT definitions, by application

Vertical	Application	Definition
Logistics and tracking	People	Wireless IoT connections deployed in tracking people. Connectivity is used to provide basic tracking functionality in wearable devices for children, the elderly and lone workers.
Logistics and tracking	Pets	Wireless IoT connections deployed in tracking pets.
Logistics and tracking	Skips	Wireless IoT connections deployed in tracking skips.
Retail	Digital signage (in store)	Cellular IoT connections deployed for in-store signage. Signs and screens that relay advertising and information to the public.
Retail	Digital signage (roadside)	Cellular IoT connections deployed in roadside signage. Signs and screens (such as permanent billboards) that relay advertising and information to the public.
Retail	Digital signage (temporary)	Cellular IoT connections deployed in temporary signage. Signs and screens for a temporary situation (such as roadworks) that relay advertising and information to the public.
Retail	Digital signage (transit hubs)	Cellular IoT connections deployed in signage at transit hubs. Signs and screens deployed in transit hubs that relay advertising and information to the public.

IoT forecast definitions [4/7]

Figure 4d: IoT definitions, by application

Vertical	Application	Definition
Retail	Digital signage (public venues)	Cellular IoT connections deployed in signage at public venues. Signs and screens deployed in public venues such as stadiums that relay advertising and information to the public.
Retail	PoS terminals	Wireless IoT connections deployed in point of sale (POS) terminals. Used as primary or back-up communications in cash registers, electronic funds transfer (EFT) or payment card machines.
Retail	Vending machines	Wireless IoT connections deployed in vending machines. Connectivity is deployed to transmit details of stock levels back to an enterprise resource planning (ERP) system.
Smart buildings	Security alarms	Wireless IoT connections deployed in security alarm systems and their back-ups for premises that are monitored by an alarm receiving centre (ARC).
Smart buildings	Security cameras	Wireless IoT connections deployed in private security cameras. Used to monitor customer premises.
Smart buildings	Smoke alarms	Wireless IoT connections deployed in smart buildings for smoke alarms systems. Connectivity is used to ensure that the smoke alarm is functioning correctly and to alert the user of malfunction.
Smart buildings	White goods	Wireless IoT connections deployed in smart buildings for white goods. Connectivity is used to provide data on location of goods, maintenance alerts and to support product recalls.
Smart cities	CCTV	Wireless IoT connections deployed in CCTV within smart cities. Connected cameras with SIMs and modems procured by the public sector to monitor public places in real time to ensure public safety.
Smart cities	Parking	Wireless IoT connections deployed in parking systems within smart cities. Includes parking meters and spaces that are connected to provide control and visibility of available parking spaces in urban areas.
Smart cities	Streetlights	Wireless IoT connections deployed in smart cities for streetlights. LPWA connectivity is used for remote management of street lighting including dimming, detecting failures and preventative maintenance.

IoT forecast definitions [5/7]

Figure 4e: IoT definitions, by application

Vertical	Application	Definition
Smart cities	Waste management	Wireless IoT connections deployed in smart cities for waste bins. LPWA connectivity is used to provide an accurate view of which waste bins are full and require emptying, allowing for collection/route optimisation.
Utilities	Electric meters	Wireless IoT connections deployed in electric meters. Used to transmit consumption data to utility providers and enable two-way communications between the provider and customer.
Utilities	Dual-fuel meters	Wireless IoT connections deployed in dual-fuel meters. Used to transmit consumption data to utility providers and enable two-way communications between the provider and customer.
Utilities	Gas meters	Wireless IoT connections deployed in gas meters. Used to transmit consumption data to utility providers and enable two-way communications between the provider and customer.
Utilities	Water meters	Wireless IoT connections deployed in water meters. Used to transmit consumption data to utility providers and enable two-way communications between the provider and customer.
Utilities	Water pipelines	Wireless IoT connections deployed in water pipelines. LPWA connectivity is used to transmit data on flow pressure to detect leakages.
Utilities	Smart grid	Wireless IoT connections deployed in smart grid applications. LPWA is used to monitor and report faults in electricity generation and distribution equipment and transmit consumption data for smart electric meters.

IoT forecast definitions [6/7]

Figure 5: Network technology definitions

Network technology	Definition
IoT – cellular – 2G	The sum of 2G cellular IoT connections in all applications. 2G includes GSM, GPRS, HSCSD, EDGE and CDMAONE.
IoT – cellular – 3G/4G	The sum of 3G and 4G cellular IoT connections in all applications. 3G includes CDMA2000-CDMA2000 1X RTT, CDMA2000 EV-DO/EV-DV, TD SCDMA an W-CDMA HSPA family. 4G is LTE, LTE-Advanced and TD LTE, excluding LTE-M, which is categorised separately under LPWA.
IoT – cellular – 5G	The sum of 5G cellular IoT connections in all applications. Analysys Mason currently defines 5G as service of 1Gbit/s per user or greater that is deployed for data networking or a low-latency service for IoT and that utilises an extended range of spectrum bands (600MHz–700MHz and 3.5GHz–70GHz).
IoT – LPWA – NB-IoT	The sum of narrowband IoT connections in all applications. NB-IoT is an LPWA network technology that supports peak data rates of <100kbit/s. It can be deployed in existing LTE bands, in LTE guard bands or as a standalone option.
IoT – LPWA – LTE-M	The sum of LTE-M IoT connections in all applications. LTE-M is an LPWA network technology that supports peak data rates of 1Mbit/s and is compatible with the existing LTE network.
IoT – LPWA – other LPWA	The sum of all LPWA IoT connections other than NB-IoT and LTE-M (which are classified separately) in all applications. Includes protocols such as Sigfox, LoRa and Sensus's FlexNet.

IoT forecast definitions [7/7]

Figure 6: Revenue component definitions

Revenue component	Definition
Total value chain (TVC)	We assume that operators generate all of the connectivity service revenue. Conversely, operators currently generate negligible revenue from the other components (such as devices and communications hardware) and therefore these components of the value chain could provide additional revenue for operators. To summarise, connectivity revenue is 100% operator-generated, while that from the other components is only addressable.
Connectivity service	Revenue from both the transmission of data over the communications network (connectivity) and from monitoring performance, traffic patterns and faults of IoT connections (connectivity management).
Communications hardware	Revenue from IoT communications hardware, including SIMs, terminals and modules that collate machine data ready for communication, but excluding sensors connected to end machines.
Device	Revenue generated from the device or endpoint that contains the communication hardware. This includes smart meters, medical devices and consumer gadgets. We do not include the cost of the vehicle in the automotive sector.
Hardware installation	Revenue generated from physically installing and setting up IoT communications hardware.
Application	Revenue generated from software applications to interpret, manipulate and convert operational IoT data into management information, including data analytics.
Application enablement platform	Revenue generated from application enablement platforms, which enable developers to access application programming interfaces (APIs) to build new IoT applications and services.
Systems integration	Revenue generated from the activity of integrating all value chain components of a solution, such as hardware, software and communications.

Methodology: simplified forecast methodology for all connections

Figure 7a: Simplified methodology

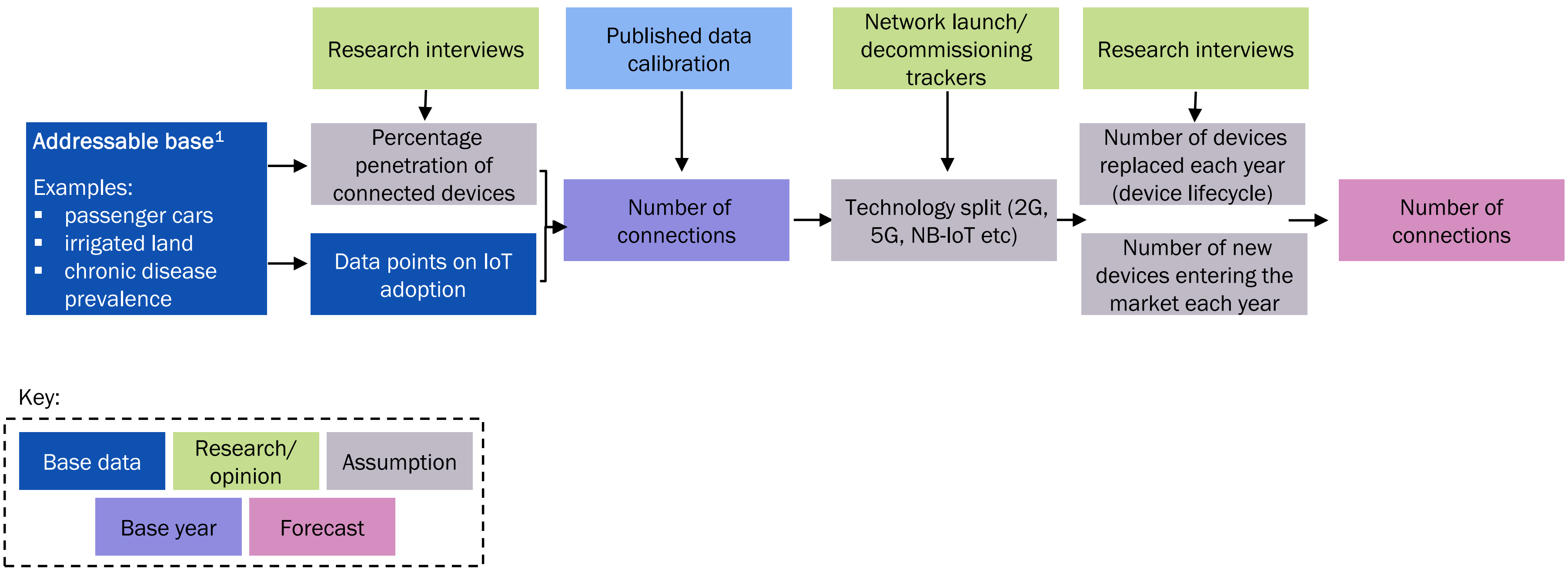


Figure 7a illustrates the generic approach to the IoT connections forecast, but the methodology can change slightly depending on the application. For example, we must take passenger car sales data into account for passenger cars with embedded SIMs (see next slide). We calibrate our connection numbers found from summing the number of connections per IoT application category (for example, automotive or fleet) with the total number of IoT connections per country published by regulators. There is little published data on the number of connected devices by application; we use published data where available and make assumptions for most applications groups based on research interviews. The technology split is published on aggregate for each country, and not for each application.

[1] Slides 4–12 show base data inputs by application.

Methodology: embedded automotive forecast methodology

Figure 7b: Methodology for passenger cars

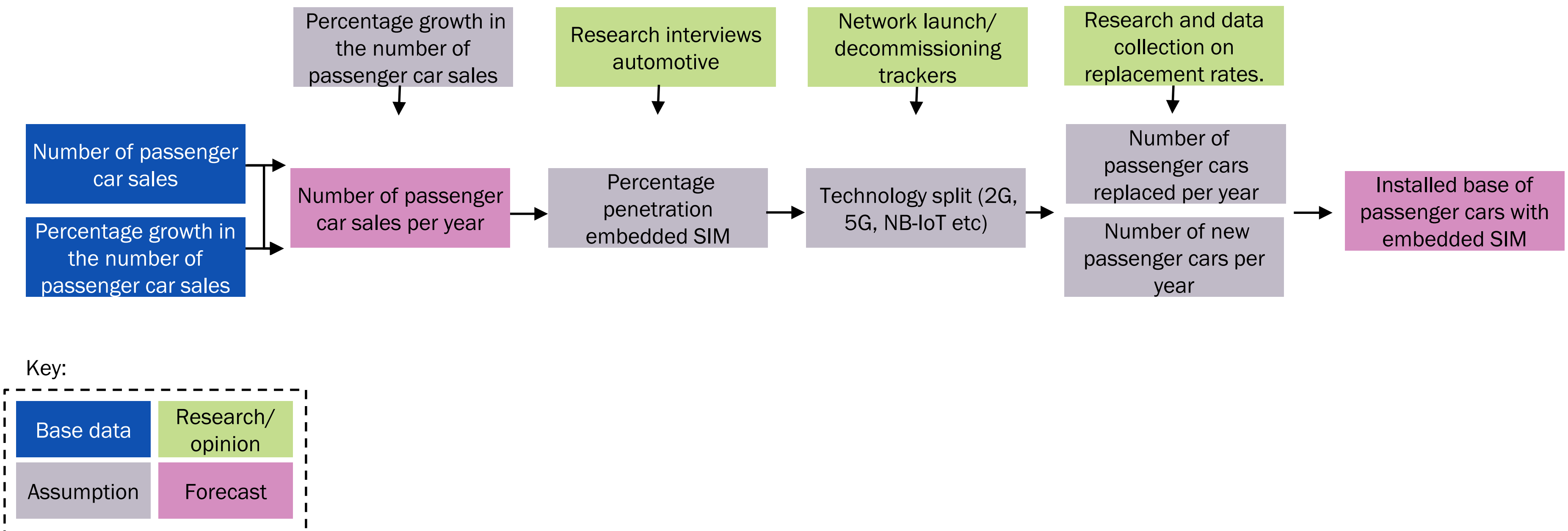


Figure 7b illustrates the forecast methodology for embedded connectivity in passenger cars.

Methodology: connectivity service revenue

Figure 7c: Methodology for connectivity revenue

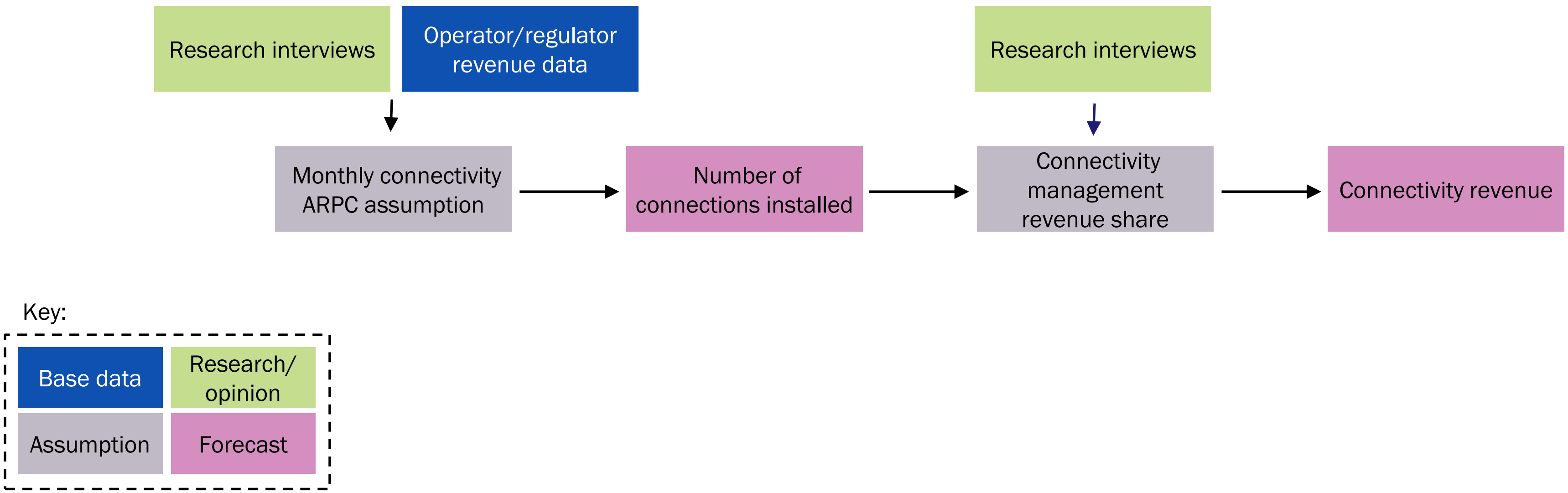


Figure 7c illustrates the forecast methodology for connectivity service revenue for all IoT applications. ARPC inputs vary by application type and our assumptions on usage. We assume that connectivity generates a recurring monthly revenue.

Methodology: hardware revenue

Figure 7d: Methodology for hardware revenue

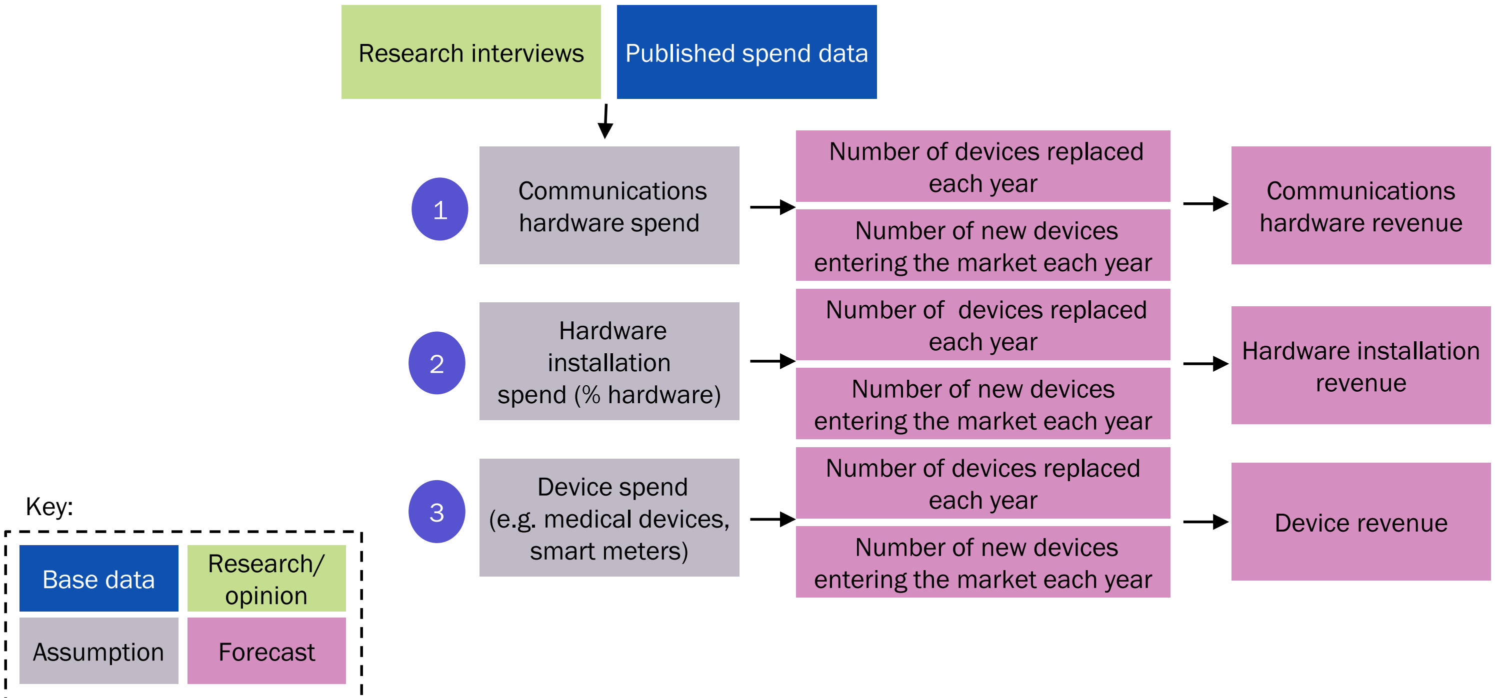


Figure 7d illustrates the forecast methodology for hardware revenue (from communications hardware, hardware installation and devices) for all IoT applications. Spend input assumptions vary by application. We include device spending for those devices that we believe are addressable by mobile operators (for example, smart meters and tracking devices). We do not include device spending for devices that are not addressable by operators (such as cars). We assume that hardware has a one-off spend per device and does not generate recurring revenue.

Methodology: application revenue

Figure 7e: Methodology for application revenue

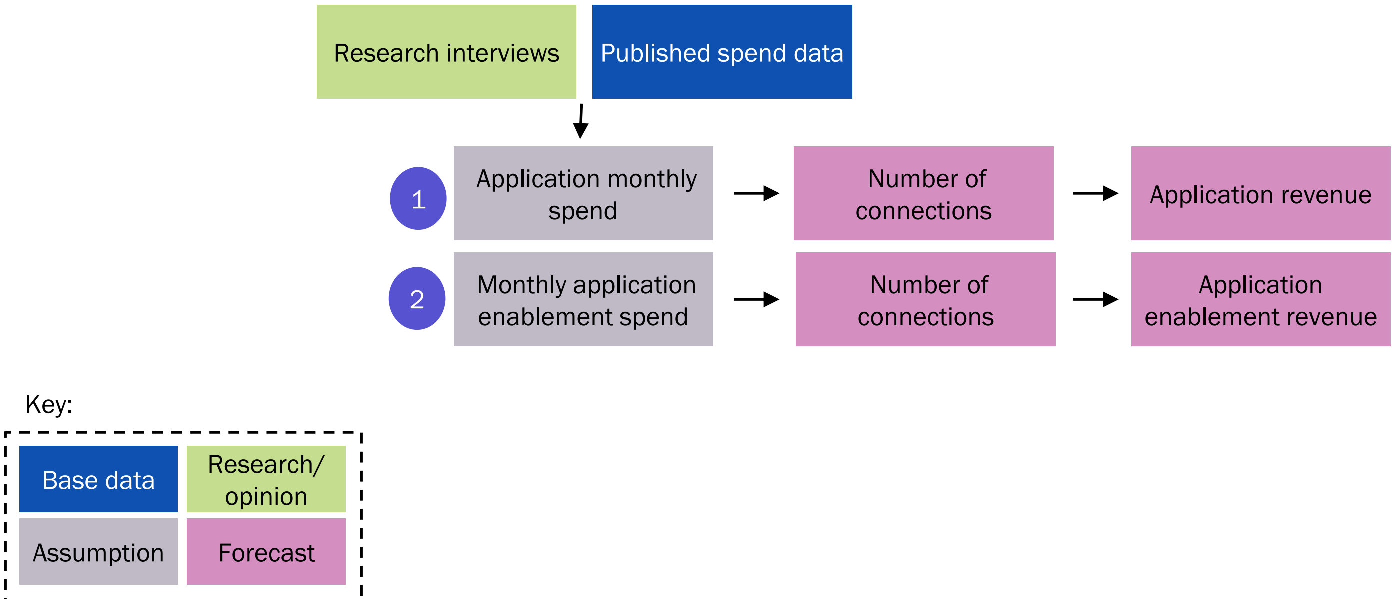


Figure 7e illustrates the forecast methodology for application revenue (formed of application revenue and application enablement revenue) for all IoT applications. Spend input assumptions vary by application. We assume that application revenue and application enablement revenue is recurring.

About the author

Michele Mackenzie (Principal Analyst) is an analyst for Analysys Mason's *IoT and M2M Services* research programme, with responsibility for M2M and LPWA forecasts. She has 20 years of experience as an analyst and conducts research on IoT verticals such as utilities, automotive, healthcare and fleet management. She also writes reports on the role of network technologies such as NB-IoT. Prior to joining Analysys Mason in February 2014, Michele was a freelance analyst with a focus on M2M and IoT technology and trends. She has written reports for Machina Research and produced research for other clients in areas such as mobile broadband and digital media. Before that, Michele worked for Ovum for 12 years, where she focused on consumer mobile applications and held various roles including Practice Leader for Consumer Services. She has also worked as a consultant for Ovum's consultancy division.

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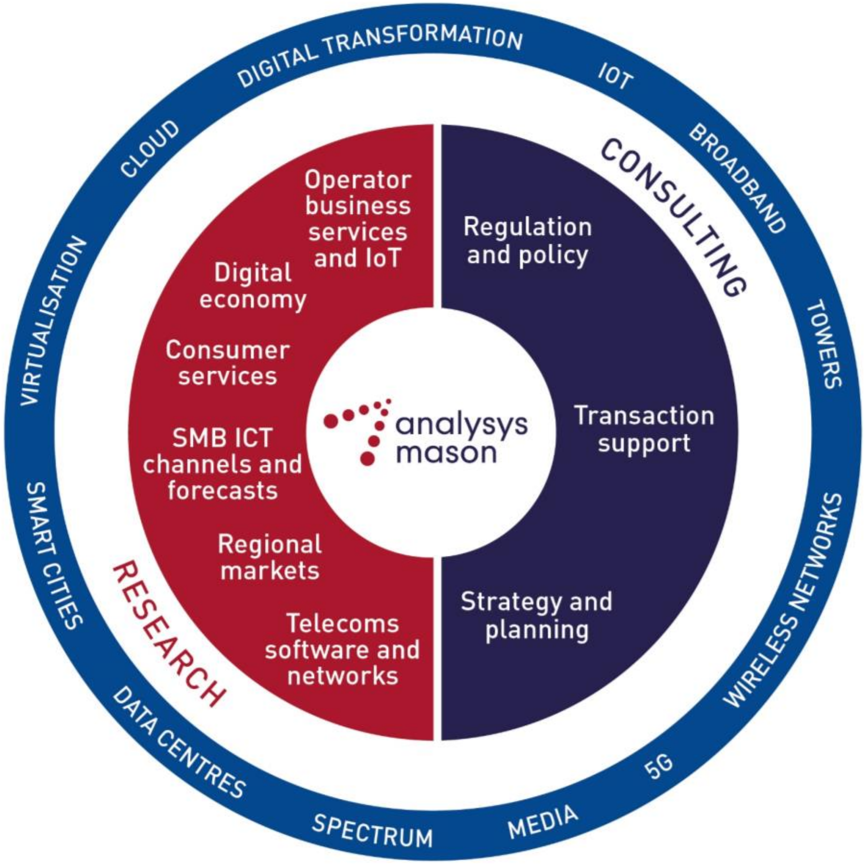

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Network-focused

Next-Generation Wireless Networks
Video and Identity Platforms
Service Design and Orchestration
Automated Assurance
Network Automation and Orchestration
Digital Infrastructure Strategies

Customer-focused

Digital Experience
Customer Engagement
Monetisation Platforms
AI and Analytics

Digital economy programmes

Digital Economy Strategies
Future Comms

Operator business services and IoT programmes

Large Enterprise Voice and Data Connectivity
Large Enterprise Emerging Service Opportunities
SME Strategies
IoT and M2M Services
IoT Platforms and Technology

SMB ICT channels and forecasts programmes

Managed Service Provider Strategies
Cyber Security

Regional markets programmes

Global Telecoms Data
Americas
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European Country Reports

DataHub

~2500 forecast and 250+ historical metrics
Regional results and worldwide totals
Operator historical data

Consulting from Analysys Mason

REGULATION AND POLICY

- Policy development and response
- Ex-ante market reviews, remedies, costing ...
- Universal Service Obligation (USO)
- Scarce resources: radio spectrum management, auction support, numbering ...
- Ex-post/abuse of dominance
- Postal sector

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TRANSACTION SUPPORT

- Commercial due diligence
- Technical due diligence
- Mergers and acquisitions (M&As)
- Debt and initial public offerings (IPOs)
- Joint-venture structuring
- Mid-market financial sponsors

STRATEGY AND PLANNING

- Commercial expertise
- Technology optimisation
- New digital frontiers

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