

# The Shared & Unlicensed Spectrum LTE/5G Network Ecosystem: 2023 – 2030 – Opportunities, Challenges, Strategies & Forecasts

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## Abstracts

As the 5G era advances, the cellular communications industry is undergoing a revolutionary paradigm shift, driven by technological innovations, liberal regulatory policies and disruptive business models. One important aspect of this radical transformation is the growing adoption of shared and unlicensed spectrum – frequencies that are not exclusively licensed to a single mobile operator.

Telecommunications regulatory authorities across the globe have either launched or are in the process of releasing innovative frameworks to facilitate the coordinated sharing of licensed spectrum. Examples include but are not limited to the three-tiered CBRS (Citizens Broadband Radio Service) spectrum sharing scheme in the United States, Germany's 3.7-3.8 GHz and 28 GHz licenses for 5G campus networks, United Kingdom's shared and local access licensing model, France's vertical spectrum and sub-letting arrangements, Netherlands' geographically restricted mid-band spectrum assignments, Switzerland's 3.4 – 3.5 GHz band for NPNs (Non-Public Networks), Finland's 2.3 GHz and 26 GHz licenses for local 4G/5G networks, Sweden's 3.7 GHz and 26 GHz permits, Norway's regulation of local networks in the 3.8-4.2 GHz band, Poland's spectrum assignment for local government units and enterprises, Bahrain's private 5G network licenses, Japan's 4.6-4.9 GHz and 28 GHz local 5G network licenses, South Korea's e-Um 5G allocations in the 4.7 GHz and 28 GHz bands, Taiwan's provision of 4.8-4.9 GHz spectrum for private 5G networks, Hong Kong's LWBS (Localized Wireless Broadband System) licenses, Australia's apparatus licensing approach, Canada's planned NCL (Non-Competitive Local) licensing framework and Brazil's SLP (Private Limited Service) licenses.

Another important development is the growing accessibility of independent cellular

networks that operate solely in unlicensed spectrum by leveraging nationally designated license-exempt frequencies such as the GAA (General Authorized Access) tier of the 3.5 GHz CBRS band in the United States and Japan's 1.9 GHz sXGP (Shared Extended Global Platform) band. In addition, vast swaths of globally and regionally harmonized license-exempt spectrum – most notably, the 600 MHz TVWS (TV White Space), 5 GHz, 6 GHz and 60 GHz bands – are also available worldwide, which can be used for the operation of unlicensed LTE and 5G NR-U (NR in Unlicensed Spectrum) equipment subject to domestic regulations.

Collectively, ground-breaking spectrum liberalization initiatives are catalyzing the rollout of shared and unlicensed spectrum-enabled 5G NR and LTE networks for a diverse array of use cases – ranging from mobile network densification, FWA (Fixed Wireless Access) in rural communities and MVNO (Mobile Virtual Network Operator) offload to neutral host infrastructure and private cellular networks for enterprises and vertical industries such as agriculture, education, healthcare, manufacturing, military, mining, oil and gas, public sector, retail and hospitality, sports, transportation and utilities.

SNS Telecom & IT estimates that global investments in 5G NR and LTE-based RAN (Radio Access Network) infrastructure operating in shared and unlicensed spectrum will account for more than \$1.4 Billion by the end of 2023. The market is expected to continue its upward trajectory beyond 2023, growing at a CAGR of approximately 27% between 2023 and 2026 to reach nearly \$3 Billion in annual spending by 2026.

The “Shared & Unlicensed Spectrum LTE/5G Network Ecosystem: 2023 – 2030 – Opportunities, Challenges, Strategies & Forecasts” report presents a detailed assessment of the shared and unlicensed spectrum LTE/5G network ecosystem, including the value chain, market drivers, barriers to uptake, enabling technologies, key trends, future roadmap, business models, use cases, application scenarios, standardization, spectrum availability and allocation, regulatory landscape, case studies, ecosystem player profiles and strategies. The report also provides global and regional forecasts for shared and unlicensed spectrum LTE/5G RAN infrastructure from 2023 to 2030. The forecasts cover two air interface technologies, two cell type categories, two spectrum licensing models, 15 frequency bands, seven use cases and five regional markets.

The report comes with an associated Excel datasheet suite covering quantitative data from all numeric forecasts presented in the report.

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9.3 7P (Seven Principles)

9.4 ABiT Corporation

9.5 Accelleran

9.6 Accuver (InnoWireless)

9.7 ADRF (Advanced RF Technologies)

9.8 Affirmed Networks (Microsoft Corporation)

9.9 AI-LINK

9.10 Airgain

9.11 Airspan Networks

9.12 Airtower Networks

9.13 Airwavz Solutions

9.14 Akoustis Technologies

9.15 albis-elcon (UET – United Electronic Technology)

9.16 Alcadis

9.17 Alef (Alef Edge)



- 9.18 Allen Vanguard Wireless
- 9.19 Alpha Wireless
- 9.20 Alsatis Réseaux
- 9.21 Amazon/AWS (Amazon Web Services)
- 9.22 Ambra Solutions-ECOTEL
- 9.23 Amdocs
- 9.24 American Tower Corporation
- 9.25 AMIT Wireless
- 9.26 Anritsu
- 9.27 ANS – Advanced Network Services (Charge Enterprises)
- 9.28 Antenna Company
- 9.29 Anterix
- 9.30 Apple
- 9.31 aql
- 9.32 Aquila (Suzhou Aquila Solutions)
- 9.33 Aqura Technologies (Telstra Purple)
- 9.34 Arctic Semiconductor (Formerly SiTune Corporation)
- 9.35 Arete M
- 9.36 Artemis Networks
- 9.37 Askey Computer Corporation (ASUS – ASUSTeK Computer)
- 9.38 ASOCS
- 9.39 ASTRI (Hong Kong Applied Science and Technology Research Institute)
- 9.40 ASUS (ASUSTeK Computer)
- 9.41 ATDI
- 9.42 ATEL (Asiatelco Technologies)
- 9.43 Athonet (HPE – Hewlett Packard Enterprise)
- 9.44 ATN International
- 9.45 AttoCore
- 9.46 Aviat Networks
- 9.47 Axians (VINCI Energies)
- 9.48 Azcom Technology
- 9.49 Baicells
- 9.50 Ballast Networks
- 9.51 BAYFU (Bayerische Funknetz)
- 9.52 BBB (BB Backbone Corporation)
- 9.53 BBK Electronics
- 9.54 BearCom
- 9.55 BEC Technologies (Billion Electric)
- 9.56 becon

- 9.57 Benetel
- 9.58 Betacom
- 9.59 BinnenBereik (NOVEC)
- 9.60 Black Box
- 9.61 Blackned
- 9.62 BLiNQ Networks (CCI – Communication Components Inc.)
- 9.63 Blu Wireless
- 9.64 Blue Arcus Technologies
- 9.65 Boingo Wireless (DigitalBridge Group)
- 9.66 Boldyn Networks (Formerly BAI Communications)
- 9.67 Branch Communications
- 9.68 BTI Wireless
- 9.69 Bureau Veritas/7Layers
- 9.70 BVSystems (Berkeley Varitronics Systems)
- 9.71 C3Spectra
- 9.72 CableFree (Wireless Excellence)
- 9.73 CableLabs
- 9.74 CalChip Connect
- 9.75 Cambium Networks
- 9.76 Cambridge Consultants (Capgemini Invent)
- 9.77 CampusGenius
- 9.78 Capgemini Engineering
- 9.79 CapX Nederland
- 9.80 Casa Systems
- 9.81 CCI (Communication Components Inc.)
- 9.82 CCN (Cirrus Core Networks)
- 9.83 Cegeka
- 9.84 CellAntenna Corporation
- 9.85 Cellnex Telecom
- 9.86 cellXica
- 9.87 Celona
- 9.88 Centerline Communications
- 9.89 Challenge Networks (Vocus)
- 9.90 CICT – China Information and Communication Technology Group (China Xinke Group)
- 9.91 Cisco Systems
- 9.92 Citymesh (Cegeka/DIGI Communications)
- 9.93 COCUS
- 9.94 Codium Networks

- 9.95 Comba Telecom
- 9.96 CommAgility (E-Space)
- 9.97 Commnet Wireless (ATN International)
- 9.98 CommScope
- 9.99 Compal Electronics
- 9.100 COMSovereign
- 9.101 CONEXIO Corporation
- 9.102 CONGIV (ROBUR Industry Service Group)
- 9.103 Connectivity Wireless Solutions (M/C Partners)
- 9.104 Contela
- 9.105 coreNOC
- 9.106 Corning
- 9.107 Council Rock
- 9.108 Cradlepoint (Ericsson)
- 9.109 Crown Castle International Corporation
- 9.110 CTL
- 9.111 CTS (Communication Technology Services)
- 9.112 Cumucore
- 9.113 DAEL Group
- 9.114 dbSpectra
- 9.115 DeepSig
- 9.116 Dejero Labs
- 9.117 DEKRA
- 9.118 Dell Technologies
- 9.119 Dense Air (SIP – Sidewalk Infrastructure Partners)
- 9.120 DGS (Digital Global Systems)
- 9.121 Digi International
- 9.122 Digicert
- 9.123 Digita (DigitalBridge Group)
- 9.124 DigitalBridge Group
- 9.125 DKK (Denki Kogyo)
- 9.126 D-Link Corporation
- 9.127 Doodle Labs
- 9.128 Druid Software
- 9.129 e-BO Enterprises
- 9.130 EDX Wireless
- 9.131 Edzcom (Cellnex Telecom)
- 9.132 EION Wireless
- 9.133 Element Materials Technology

- 9.134 EMS (Electronic Media Services)
- 9.135 Encore Networks
- 9.136 Ericsson
- 9.137 ETRI (Electronics & Telecommunications Research Institute, South Korea)
- 9.138 EUCAST
- 9.139 EXFO
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- 9.144 Fenix Group
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- 9.147 Firecell
- 9.148 Flash Private Mobile Networks
- 9.149 floLIVE
- 9.150 FMBE (FMB Engineering)
- 9.151 Fortress Solutions
- 9.152 Foxconn (Hon Hai Technology Group)
- 9.153 Fraunhofer FOKUS (Institute for Open Communication Systems)
- 9.154 Fraunhofer HHI (Heinrich Hertz Institute)
- 9.155 Fraunhofer IIS (Institute for Integrated Circuits)
- 9.156 Fraunhofer IPT (Institute for Production Technology)
- 9.157 FreedomFi
- 9.158 Freshwave Group (DigitalBridge Group)
- 9.159 FRTek
- 9.160 FSG (Field Solutions Group)
- 9.161 Fujitsu
- 9.162 Future Technologies Venture
- 9.163 G REIGNS (HTC Corporation)
- 9.164 G+D (Giesecke+Devrient)
- 9.165 GCT Semiconductor
- 9.166 GE (General Electric)
- 9.167 Gemtek Technology
- 9.168 Getac Technology Corporation
- 9.169 GigSky
- 9.170 Global Telecom
- 9.171 Globalgig
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- 9.173 Google (Alphabet)
- 9.174 Granite Telecommunications
- 9.175 Grape One (Sumitomo Corporation)
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- 9.178 GS Lab (Great Software Laboratory)
- 9.179 GXC (Formerly GenXComm)
- 9.180 Hawk Networks (Althea)
- 9.181 HCL Technologies
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- 9.183 Hitachi
- 9.184 HMF (Hytera Mobilfunk)
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- 9.186 HP
- 9.187 HPE (Hewlett Packard Enterprise)
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- 9.217 JRC (Japan Radio Company)
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