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The Cognitive Computing Continuum Policy Landscape: Republic of Korea

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Executive Summary

Korea’s policy landscape does not typically use the term ‘cognitive computing continuum’, but national strategies consistently treat cloud platforms, edge infrastructure, IoT deployments, AI models, and semiconductor supply chains as mutually reinforcing elements of national capability (MSIT, 2019; Government of the Republic of Korea, 2020; MOTIE, 2021). A defining feature is deployment-oriented road-mapping with government programs aiming to rapidly scale public-sector cloud migration, build network/edge platforms around 5G to 6G evolution, and reinforce industrial competitiveness through semiconductor policy and large-scale AI commercialization.

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Background: Korea's Geopolitical Situation

South Korea's strategic technology policy is shaped by its security alignment with the United States, economic interdependence with China, and expanding cooperation with the EU in research and standards. Semiconductors and communication networks are framed as critical national infrastructure, placing supply-chain resilience and standards leadership at the center of digital policy (OECD, 2021; MOTIE, 2021).

Korea's Digital Policy Organisations

Below are core organizations that contribute to Korea's Digital Policymaking:

- Ministry of Science and ICT (MSIT): National AI strategy, telecom/network policy (5G/6G), and major R&D roadmaps.
- Ministry of Trade, Industry and Resources (MOTIR; formerly MOTIE): Industrial strategy for semiconductors, smart factories, and industrial digital transformation.
- Ministry of Interior and Safety (MOIS): Digital government platforms and smart city governance.
- National IT Industry Promotion Agency (NIPA) / Electronics and Telecommunications Research Institute (ETRI) / Institute for Information & communication Technology Planning & evaluation (IITP): Program execution and state-aligned R&D capacity for AI, networks, and edge technologies.

Cloud Policy: Cloud First, Public-Sector Scope, and CSAP Mechanics

Korea's 'Cloud First' direction for government information systems is implemented through a combination of cloud adoption mandates/guidance, procurement frameworks, and security certification. In practice, the Cloud Security Assurance Program (CSAP), which is a cloud service security certification regime supported by the Korea Internet & Security Agency (KISA), is a primary gatekeeper for selling cloud services to Korean public-sector organizations (KISA/CSAP; U.S. Dept. of Commerce, 2024).

Public-sector scope: Korea's CSAP is a mandatory security certification for cloud service providers (CSPs) offering services to public sector entities, requiring strict adherence to national security standards, including data localization in Korea, isolation, and handling of sensitive data through High, Medium, or Low tiers, with recent amendments by the MSIT adjusting requirements for broader cloud adoption. CSAP applies broadly across central, provincial, and local public-sector entities, with limited exceptions. Recent policy discussions emphasize that meaningful participation in government digital transformation typically requires CSAP certification at or above a mid-tier level, reflecting the sensitivity of many government workloads and the public sector's scale (U.S. Dept. of Commerce, 2024).

Certification structure and tiers: CSAP has evolved toward a tiered risk-based approach. Public materials from major cloud providers describe CSAP as providing standardized security assessment and authorization for cloud products/services used by public-sector customers (Microsoft, 2025; Google, n.d.; AWS, n.d.). In parallel, domestic providers describe CSAP as a certification system that verifies whether a provider's cloud service meets information-protection standards, with multiple certification types/levels (NAVER Cloud docs, 2025).
Typical compliance mechanics: Public descriptions of CSAP requirements emphasize controls that are more prescriptive than many commercial regimes, including: (i) government customer isolation requirements (including segregation expectations), (ii) data localization expectations for systems serving government customers, (iii) backup/continuity requirements, and (iv) operational and management staffing expectations located within Korea. In addition,

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procurement for some public-sector ICT products intersects with domestic cybersecurity evaluation schemes and encryption certification expectations (U.S. Dept. of Commerce, 2024).

Market structure implications: CSAP's gatekeeping role has (a) strengthened domestic 'public-sector cloud' market positions and (b) shaped how hyperscalers participate (often via certified configurations/services). Major providers publish CSAP compliance pages describing the scope and purpose of certification for Korean public sector customers (AWS, n.d.; Microsoft, 2025; Google, n.d.). Domestic providers and integrators also market CSAP-validated offerings for government workloads, including Samsung SDS' public-sector cloud offerings (Samsung SDS, n.d.).

Reform and calibration: Legal and policy commentary notes periodic debate about whether CSAP's uniform requirements create barriers to entry and whether standards should better reflect workload-specific risk. Reform proposals and discussions have been documented in legal/industry briefings (Kim & Chang, 2023).

Next-Generation Networks and Edge Platforms: 6G Roadmap Staging and Targets

Korea treats next-generation communication networks as strategic infrastructure that anchors edge platforms for real-time AI and IoT applications. MSIT's '6G R&D Implementation Plan' lays out action plans in three pillars: (1) securing key original technologies, (2) gaining dominance in international standards and patents, and (3) laying an R&D-to-industry foundation (MSIT, 2021).

Investment and near-term R&D window (up to 2025): The plan states an investment program of KRW 220 billion up to 2025, including core technology development and standards-related activities, and also references Korea–U.S. cooperation with a budgeted joint research track (MSIT, 2021). It defines 'six focus areas' and associated strategic technologies spanning ultra-performance, ultra-band (THz), ultra-space (non-terrestrial integration), ultra-precision (latency), ultra-intelligence (AI-native networking), and ultra-reliability/security (MSIT, 2021).

Implementation staging (2021–2025): MSIT explicitly describes a staged engineering trajectory: requirements identification (2021) → elementary technology design/realization (2022) → advancement and testing of linked elementary technologies (2025) → integration and testing of core technologies (2024) → stabilization and optimization of core technologies (2025) (MSIT, 2021). This staging reflects Korea's historical pattern from 4G→5G, where standardization leadership and early testbeds preceded commercial rollout.

Rollout horizon and targets (2028–2030). MSIT notes global expectations for 6G rollout between 2028 and 2030 and positions Korea to 'take the lead once again' based on its early launching experience of 5G networks (MSIT, 2021). Industry reports and governmentlinked communications have echoed ambitions for early commercial 6G deployment toward the late 2020s (RCR Wireless, 2021).

Non-terrestrial and satellite validation sub-roadmap (to 2031): A distinctive feature is the plan's integration with a satellite network technology development strategy, including staged launches of 14 LEO satellites for validation/demonstration by 2031 (5G validation satellite in 2025; 5G demo satellites in 2027; pre-6G demo in 2029; 6G demo in 2031) (MSIT, 2021).

Standards and patent leadership: MSIT highlights Korea's leadership positions in key bodies (e.g., ITU and 3GPP) and describes structured support for standard-essential patent strategy in parallel with R&D funding (MSIT, 2021).

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Cloud–Edge–IoT Policy

Korea's Cloud–Edge–IoT policy environment is best understood as a coupling of (i) rapid cloud migration in the public sector, (ii) telecom-led edge platforms anchored in 5G and evolving toward 6G, and (iii) industrial IoT deployment at scale via smart factories and logistics systems.

Cloud layer: The public sector is encouraged (and in many contexts required) to migrate systems to cloud platforms under a Cloud First direction, with procurement and eligibility shaped by security certification (see CSAP section). This drives a steady pipeline of public workloads into accredited cloud environments, including common platform services (identity, citizen portals, analytics) and agency-specific applications.

Edge layer: Korea's edge trajectory is shaped by telecom operators integrating compute and platform services into 5G networks. This supports ultra-low-latency services for industrial automation, video analytics, and mobility. Edge is treated as a platform capability rather than an ad-hoc architectural add-on: operators and large systems integrators provide reference stacks that combine connectivity, orchestration, and application services.

IoT layer: IoT deployment is strongly driven by industrial policy. Smart factory programs and logistics/energy digitalization initiatives have created large-scale demand for sensors, gateways, industrial controllers, and device-management platforms. In practice, IoT policy is linked to performance and deployment speed more than to vendor-neutral interoperability; which can accelerate rollout but raises medium-term portability and lock-in risks.

Artificial Intelligence Policy

Korea's National AI Strategy (2019; updates through 2022) frames AI as a foundational technology for productivity, public-sector modernization, and future industries (MSIT, 2019). Policy execution emphasizes (i) scaling data infrastructure and compute, (ii) accelerating adoption in priority sectors, and (iii) trust/safety-oriented measures to support social acceptance.

Compute and models: Korea's policy discourse increasingly references 'sovereign AI'—domestic capability to build, train, and deploy foundation models aligned with Korean language and institutional contexts. This emerges through a mix of public R&D programs (often executed through IITP/ETRI/NIPA) and private development by major platform firms. AI deployment is explicitly treated as spanning cloud and edge: cloud for training and large-scale inference, edge for latency-sensitive decision-making in robotics, industrial automation, and smart infrastructure.

Public-sector AI: AI is linked to digital government goals: automation of back-office processes, analytics for service delivery, and citizen-facing services. Adoption is moderated by security and data governance requirements, including PIPA constraints and CSAP-certified infrastructure.

Trustworthy AI: Korea has published stepwise plans for 'trustworthy AI' through 2025, emphasizing reliability, safety, and accountability. These plans are often framed as enabling adoption at scale by reducing risk and supporting institutional confidence.

Semiconductor Design and Production Policy

Semiconductors form the backbone of Korea's cognitive computing continuum. Korea's 2021 K-Semiconductor strategy positions semiconductors as a national strategic industry and frames a long-horizon agenda to sustain global leadership and expand investment through 2030 (MOTIE, 2021).

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Memory leadership and AI infrastructure: Korea's global dominance in memory chips underpins the AI compute stack. Policy and industry activity increasingly extend into advanced packaging and supply-chain reinforcement to meet AI-driven demand.

System semiconductors and AI accelerators: A core policy objective is expanding competitiveness beyond memory into system-on-chip design, accelerators, and edge-AI chips. This links directly to national priorities in smart manufacturing, robotics, autonomous systems, and on-device AI. Government programs complement private investment through incentives, R&D support, and industrial cluster initiatives.

Strategic link to networks/edge: 5G/6G roadmaps increase demand for specialized RF components, baseband/accelerator silicon, and energy-efficient compute at the network edge. Semiconductor policy thus reinforces Korea's network-led edge strategy.

Data Governance and Data Policy

Korea's data governance framework is anchored in the Personal Information Protection Act (PIPA) and overseen by the Personal Information Protection Commission (PIPC). Reforms enabling broader use of pseudonymized data under defined conditions have supported analytics and AI training while maintaining strong privacy protections.

Sector data platforms: Rather than adopting an EU-style federated 'Data Spaces' model, Korea's data sharing is often implemented through sector-specific platforms (health, mobility, manufacturing, public administration). This supports rapid implementation by tailoring governance and technical interfaces to sector needs. However, it can create fragmentation across sectors and make cross-domain interoperability a later-stage engineering problem.

Cross-border and security considerations: For sensitive public-sector and regulated workloads, data localization and security certification expectations interact with cloud adoption. This strengthens domestic control but can constrain the portability of workloads and the ability to use global multi-region architectures.

Smart City Policy

Korea has used smart city initiatives as deployment vehicles for integrated Cloud–Edge–IoT–AI systems. Large-scale testbeds, most prominently Songdo, Sejong and Busan, serve as experimental platforms for real-time urban data processing, digital twins, and AI-driven service optimization.

Smart city stacks typically combine (i) IoT sensing for transport, environment, and public safety; (ii) edge compute for latency-sensitive analytics; and (iii) cloud platforms for aggregation and long-horizon optimization. Governance is often implemented through coordinated platform procurement with strong prime contractor roles. Compared with Japan's emphasis on vendor-neutral reference architectures, Korea's approach is more implementation-driven

A secondary policy objective is exporting smart city models and associated platform capabilities, linking domestic testbeds to international market positioning.

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Industrial Efforts and Major Domestic Players

Korea's continuum is reinforced by major domestic firms in the private sector that couple infrastructure investment (cloud and data centres), AI foundation models, network platforms, and semiconductor roadmaps.

Samsung (devices, networks, and 6G): Samsung Research has published multiple 6G vision documents, including a 2020 6G white paper outlining candidate technologies and a 2025 white paper emphasizing 'AI-native & sustainable communication' (Samsung Newsroom, 2023; Samsung Newsroom, 2025). Samsung has also introduced in-house generative AI models (Samsung Gauss) and has discussed product integration pathways (Samsung Developer, 2023; Samsung Newsroom, 2023).

SK (memory/AI infrastructure and telecom platforms): SK hynix is a leading supplier of high-bandwidth memory (HBM) used in AI accelerators and has announced large investments in advanced packaging capacity to meet AI-driven demand (Reuters, 2026). In telecommunications, SK Telecom has published a 6G white paper and, more recently, announced hyperscale AI foundation models (A.X K1) positioned as part of a full-stack AI ecosystem (SK Telecom, 2023; SK Telecom, 2025).

LG (industrial AI and 6G ecosystem): LG AI Research develops the EXAONE family of foundation models and publishes technical materials and model releases, including technical reports for K-EXAONE (LG AI Research, 2026). In the network ecosystem, LG Uplus has released 6G-oriented materials (e.g., non-terrestrial network direction) and has signalled investment in AI and security for next-generation services (RCR Wireless, 2025).

Naver (domestic cloud + sovereign AI posture): Naver and Naver Cloud position HyperCLOVA X and related models as strategic assets for 'AI sovereignty' and domestic platform competitiveness, with public communications emphasizing sovereign AI capability and cloud/data-centre infrastructure (NAVER, 2024–2025; NAVER Cloud, 2025).

Kakao (platform AI integration): Kakao and Kakao Brain have publicized Korean-language foundation models such as KoGPT and have discussed integrating AI agents into messaging and platform services as part of their consumer platform strategy (Kakao, 2021; Pulse/MK, 2024; KED Global, 2024).

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CONCLUSIONS

Across cloud, edge, IoT, AI, and semiconductors, Korea's policies and industrial strategies form a coherent continuum even without an explicit terminology that covers all technologies. Cloud First procurement channels shaped by CSAP, a staged 6G roadmap linking R&D and standards to late-2020s rollout, and strong industrial investment by major domestic players position Korea for rapid deployment and export competitiveness. The principal medium-term policy tensions concern interoperability, portability, and concentration of platform power.

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