Intelligent Operations: Adaptive, Energy Saving, & High Performing

Intent-driven automation delivers proactive power savings and improved user experience.

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Cost and sustainability pressures demand greater operational control than traditional network management methods. Networks must deliver high performance and energy efficiency. Active network operation and dynamic control are vital to meeting changing traffic demand, optimizing energy, and securing service performance.

Operators need intelligent operations. To deliver high performance and guarantee customer experience, they must leverage intent-driven automation and granular data insights. The following foundations of RAN programmability underpin intelligent operations:

- **Real-time observability:** Granular, standardized metrics must expand to include an energy and performance focus. Data provides real-time insights into the RAN and benchmarking to improve future targets and offer greater choice (e.g., supporting better grid energy price management, forecasting cell-site expansion, etc.).

- **Service-aware:** Service expectations are increasing. Operators must optimize energy consumption but deliver individual service performance expectations (e.g., bandwidth, latency, etc.). Artificial intelligence (AI)-driven automation aids management. By correlating data, the network can adapt resources dynamically to changing conditions to improve customer experience and boost energy efficiency.

- **Intent-driven networks:** Evolving to intent-driven operations abstracts complexity and allows target-based outcomes in real-time to fulfill specific performance KPIs and energy savings. RAN programmability implements the functionality (see *Intent-Driven Networks: Energy Efficiency & Performance*).

Active network operation and optimization

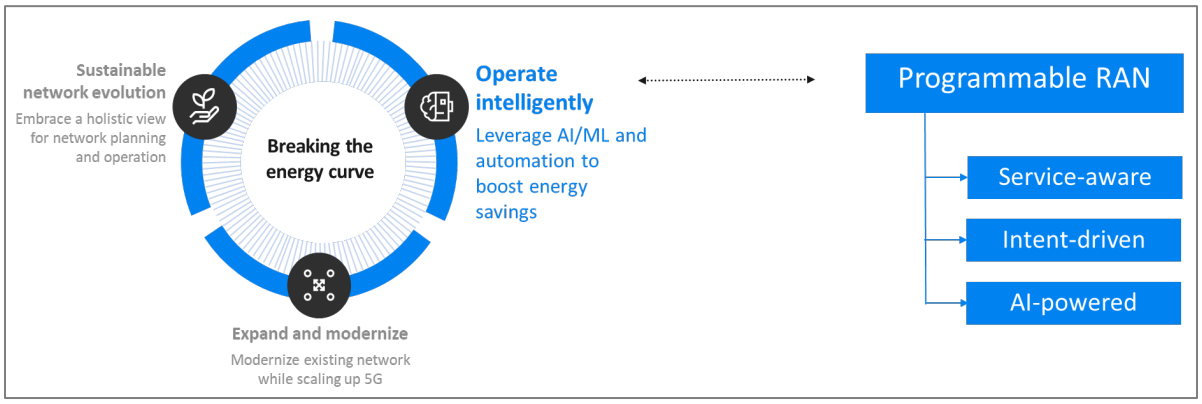
Traditional network capacity dimensions to full-load conditions (which may rarely occur) or uses pre-set/manual capacity optimization, sometimes only activated at night. RAN programmability can now deliver active, frequent adaptability 24x7.

The figure (below) shows how programmability underpins intelligent operations and active energy savings. "Energy performance" must become a service-dependent operational state that leverages AI automation to minimize energy consumption when there is no perceived performance difference. Service-aware RANs will assure customer experience per application as traffic demand changes; for example, energy performance requirements for file downloads differ from a low latency mobile gaming service.

RAN energy-saving software and programmability implement automated performance optimization. Actions like activating/deactivating the mMIMO antenna, switching off carriers and cells, reconfiguring radio frequency channels, using low power baseband and radio (sleep) modes, etc., reduce power consumption where location and service allow.

Intent-driven automation powered by AI will boost capabilities to operate intelligently. Network and user experience analysis across multiple cell sites supports broader sustainable business decisions. Examples include using cell-site energy storage or renewables during peak grid tariff periods to reduce costs, predicting potential customer experience degradation, timescales for optimizing resources, and capacity upgrades.

The value of AI in intent-driven networks



Source: Ericsson

Future networks: Energy and user experience aware

Optimizing energy performance requires ongoing synergy between network operations and service needs. RAN programmability can utilize RAN service awareness to optimize per-application performance based on traffic load and service demands. Intelligent operations must replace traditional reactive methods to enable operators to deliver dynamic intent-driven objectives and active energy savings.