ETSI Zero-touch Network & Service Management

Intent-driven Autonomous Networks

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ZSM architecture framework (ZSM 002)

Architectural principles:

- Modular, flexible and scalable service-based architecture
- Separation of concerns: network domain management and end-to-end cross-domain service management, where each domain addresses its own sphere of expertise
- Support of model-driven, open interfaces
  - **Support of intent-based interfaces**
  - Adaptive closed-loop management automation, where the automated decision-making mechanisms can be set by rules and policies
  - Support of stateless management functions
  - Design for resilience
  - Functional abstraction
General properties of intents

Declarative goals and utility:
• Intent is declarative instead of imperative, leaving its implementation open
• Intent is ideally an expression of utility*, where the properties of the outcome are satisfactory rather than requiring a specific outcome

Infrastructure agnostic and portable:
• Intent is not device- nor infrastructure-specific.
• Intent is adaptive to user expectation, contracts and changing requirements but decoupled from variations in the underlying infrastructure
• Intent is portable across platforms, vendors, implementations, etc.

Composable and additive:
• Multiple intents may be given to the autonomous system independently
• The system is expected to consider them altogether

Complete and exhaustive:
• Intent is describing all expectations comprehensively
• If a requirement or concern is not described by intent, it is not recognized as required or relevant.

Persistent:
• It is a knowledge object with actively managed life-cycle
• Intent stays valid until it is actively removed

*utility: the total satisfaction received from consuming a good or service

Utility is a term used in economics. Economic theories based on rational choice usually assume that consumers will strive to maximize their subjective utility. It depends upon the mental assessment of the consumer and is determined by several factors which influence the consumer’s judgment.
Direction of Study

• The ETSI ZSM FW is getting traction as a clean, straightforward description of a service-based architecture for zero-touch automated network and service management in a multi-vendor environment.

• Several standards bodies and open-source projects have initiated new work items on Intent. The study will take the progress from those, combined with prior work.

• The purpose is to make intent-driven interactions feasible in ZSM, provide guidelines and fill gaps in the industry.

• The main task is to investigate and suggest ways to enrich ZSM’s service-based reference architecture with the possibility to receive, transform, convey and act upon intents.

• The results from the study will either be used in an updated version of ZSM002 - Reference Architecture or become the basis for a new normative specification.
TM Forum AN and ZSM framework
TM Forum – concept of Intent handling function

Introduce the concept of intent handling functions into the architecture of network operation.

Introduce an architecture of intent handling built from intent handling functions. (The picture shows an example hierarchy of intent handling. Other hierarchies are possible.)

Use the Intent Handling Function as a basic building block of intent based operations.

The intents exposed for Human-to-machine use cases are not the same as intents used for machine-to-machine purposes.
The E2E Service MD transforms and conveys an intent towards MDs or interprets the intent and transforms it into a set of services from the MDs.

The MDs transforms and conveys an intent towards Network Resources or interprets the intent and transforms it into resource requests.

An MD may also reshape its offered services to match the intent.
Intent conflicts

• Intents are composable, additive and persistent.
  • New intents may come and go (lifecycle managed by consumer)

• Conflicts may be detected while they are interpreted and transformed. Intent detection and resolution may ease (or eliminate) future conflicts in service or resource levels

• Result of conflict detection can be a negotiation phase between consumer and producer
Intent principles in ZSM

- An intent emanates from a service or network customer.
- An intent provides guidance to an autonomous network regarding expectations from the customer on service or network behavior.
- An intent has a separate life cycle (different from the service offered).
- A zero-touch network could be based exclusively on intents, but a mixed scenario where intent complements service-based management is more likely.