Policy-based Architecture to enable Autonomic Communications

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Abstract

The increase in complexity of network management systems and a consequent lack of association to business requirements has driven the need for autonomic communications. By integrating context information, autonomic communications can provide more efficient means to counter technical problems found in complex network systems and at the same time address associated business requirements. In this poster, we propose an autonomic communications architecture that manages complexity through policy-based management where we use the shared information/ data model (SID) integrated with knowledge-based reasoning mechanisms to provide self-governance behaviour.

Key Concepts

Policy Continuum

Our policy framework uses the DEN-ng (Directory Enabled Networks – next generation) policy continuum to enable policies to be written for different constituencies using vocabularies native to each constituency. The resulting set of policies are then reconciled into a common policy language in the Policy Refinement module.

The Shared Information/ Data Model (SID)

The information model is based on the Shared Information/Data model (SID) of the TM Forum. The SID is a subset of the DEN-ng initiative, which is a unified model that integrates the information model and associated policies .

Virtual Software Layer

The purpose of the virtual software is to support autonomic functionality for different heterogeneous networks and components. Autonomic networks achieve governance through (intelligent) decision-making .

Infrastructure Layer

The infrastructure includes network elements and other computing devices as well as software that manages them. The type of protocols and adaptability mechanisms used depend on the current context as well as the type of behavior that is being orchestrated.

Proposed Architecture

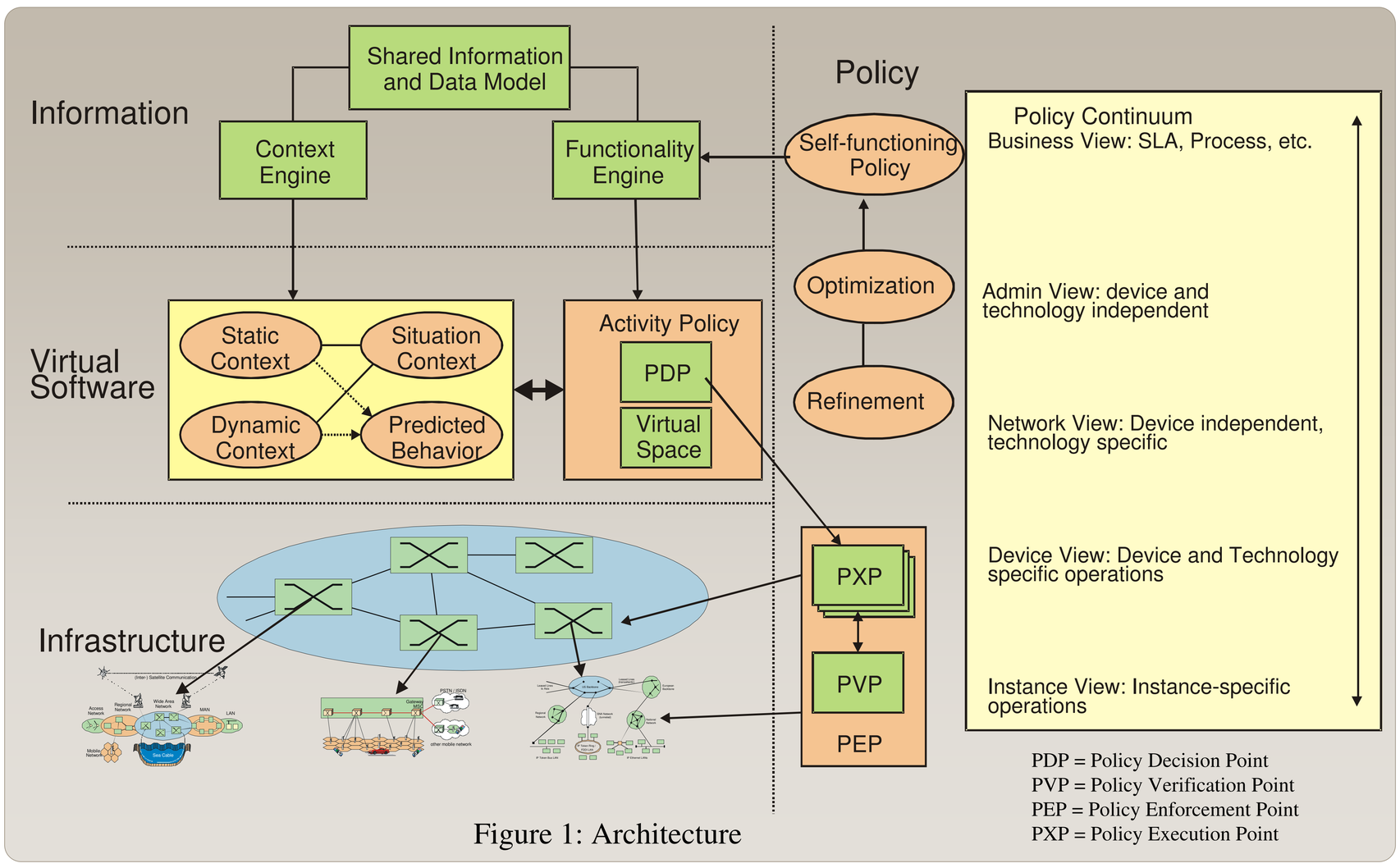

Figure 1: Architecture

Techniques and Technologies

The Virtual Software Layer provides self-organising behaviour, and abilities to deal with heterogeneity and scalability as the infrastructure layer changes and grows.

Context information is delivered to the Virtual Software Layer from sensors (software / hardware) within the architecture, where knowledge based reasoning and cognitive techniques are used to develop self-governance, and aid intelligent decision making.

The Shared Information / Data model allows information to be shared across domain boundaries allowing for inter-domain context transfer and inter-domain policy negotiation.

Processes to enable dynamic policy refinement and dynamic policy conflict detection and resolution are being developed to allow adaptable management of heterogeneous networks.

Future Work

Develop and test the simulation models through OPNET

Contribute to the TMF SID Policy Addendum and NGOSS Policy Architecture document, to improve policy capabilities in future version of the architecture

Develop customised policy language, and interface to OPNET simulation environment

Develop processes for policy refinement and dynamic policy conflict detection and resolution

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