A Layered Architecture for Capacity Planning in Hybrid Networks

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Abstract

An important challenge of network intelligence is capacity evaluation and planning (CEP). CEP is defined typically as follows:

1. monitoring current network characteristics;
2. understanding environmental constraints/considerations;
3. forecasting future needs and technology;
4. evaluating technical opportunity;
5. creating most appropriate, consistent, and coordinated plans on a long, medium, and short term basis;
6. modifying plans based on results of actual implementations in order to provide ongoing cost effective and timely communication services to the users.

Here we propose a framework for intelligent CEP. We cast the CEP task into a multi-layer architecture, where each layer subsumes the prior layers. In this respect we borrow from the *subsumption architecture* in the robotics community. Importantly, if a Layer N task fails there is no interference with the lower-layer tasks. Our layers correspond roughly to (i) current capacity evaluation, (ii) supervised what-if scenarios and capacity evaluation thereof, (iii) unsupervised what-if scenarios, and (iv) automated capacity control.

A goal of our work is to accommodate the evolution from packet-based, to hybrid, to cell-based ATM networks. In addition, our approach is link-centered as opposed to device-centered, where an evaluation of link capacity is relative to a link's work compared to its contribution to traffic throughput. An evaluation of overall network capacity is a function of evaluations of all link capacities.

Keywords

Capacity Planning, Performance Management, Change Management