PCE and SDN for optical networking

F. Cugini¹, F. Paolucci², N. Sambo², A. Giorgetti², A. Sgambelluri², P. Castoldi²
1: CNIT, via Moruzzi 1, Pisa, Italy
2:TeCIP, Scuola Superiore Sant'Anna, via Moruzzi 1, Pisa, Italy
e-mail: filippo.cugini@cnit.it

Abstract: The Path Computation Element (PCE) Architecture is rapidly evolving, extending its original stateless condition with additional capabilities, including the stateful, active and instantiation functionalities. This drives the implementation of novel solutions enabling effective software defined networking (SDN). Such advanced PCE functionalities are discussed and experimentally demonstrated in a flexible grid optical network testbed including SDN-controlled functionalities.

1. Introduction

The talk will present and discuss the following architectural solutions:
• Stateless Path Computation Element (PCE) architecture
• Stateful PCE functionality
• Active PCE functionality
• PCE Architecture with instantiation capabilities
• SDN controller based on OpenFlow
The aforementioned PCE solutions will be discussed in the specific context of flexible optical networks [1-6]

2. Experimental demonstrations

Simulative and experimental results will be presented to show the benefits and the novel functionalities supported by the considered advanced PCE-based control plane.

The following aspects will be specifically addressed:
• Provisioning performance in the case of different control plane architectures

Fig. 1: blocking probability performance
• PCE Implementation

Fig. 2: PCE architecture

Routing protocol/ IMS
TED
Path computation module
Communication module
PCEP

Fig. 3: PCEP Protocol enabling elastic optical operations

• PCE Implementation in flexible and elastic optical networks

Fig. 4: PCE-driven de-fragmentation operation (push-pull technique [6])

References