Software self-management for IP based Networks

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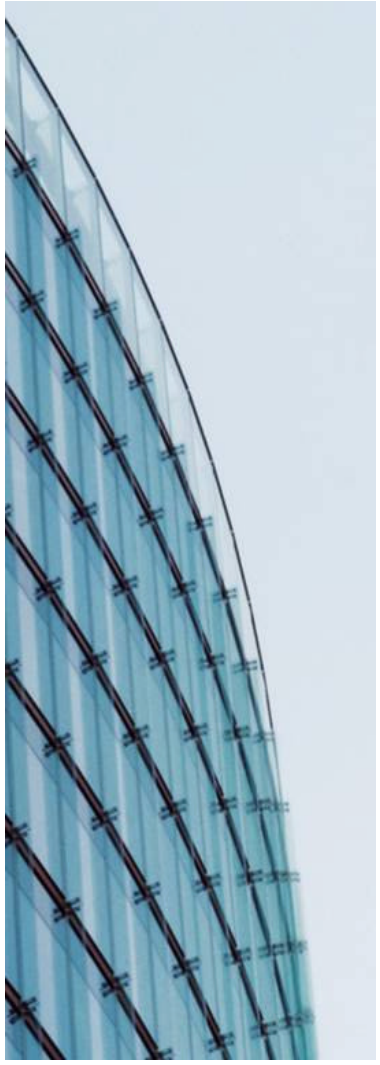


1. **Introduction to self-management**

   Main requirements, benefits, migration

2. **Proposed solution**

   Fundamental concepts and function overview, further enhancements

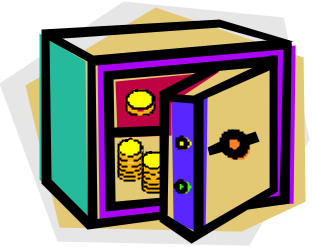
3. **Outlook**

   Further extensions and research issues

4. **Conclusions**

Motivation

Software management in mobile networks today is a major Operation cost (OPEX) issue



- Manpower intensive
- High hourly cost

The tendency is towards a tougher situation

- Increasing network and software complexity
- Tighter time to market and broader feature offer

The answer

self-management

i.e. shifting tasks from humans to machines!

Requirements and benefits

Autonomic management

- NE defines when, what and how upgrade

Automatic management

- Preparation, execution, verification, fallback

Software self management allows to manage large networks by reducing OPEX and increasing network reliability

- Reduced manpower effort
- Less frequent failures
- New features faster and cheaper in operation

Steps toward a full self management solution

Today: semi-automated SW management

- State-of-the-art in IT world, but telecom specific requirements have to be considered

Step 1: semi-autonomic SW management

- Including pre-and post installation actions.
- Workflow customised for the NE by the agents.

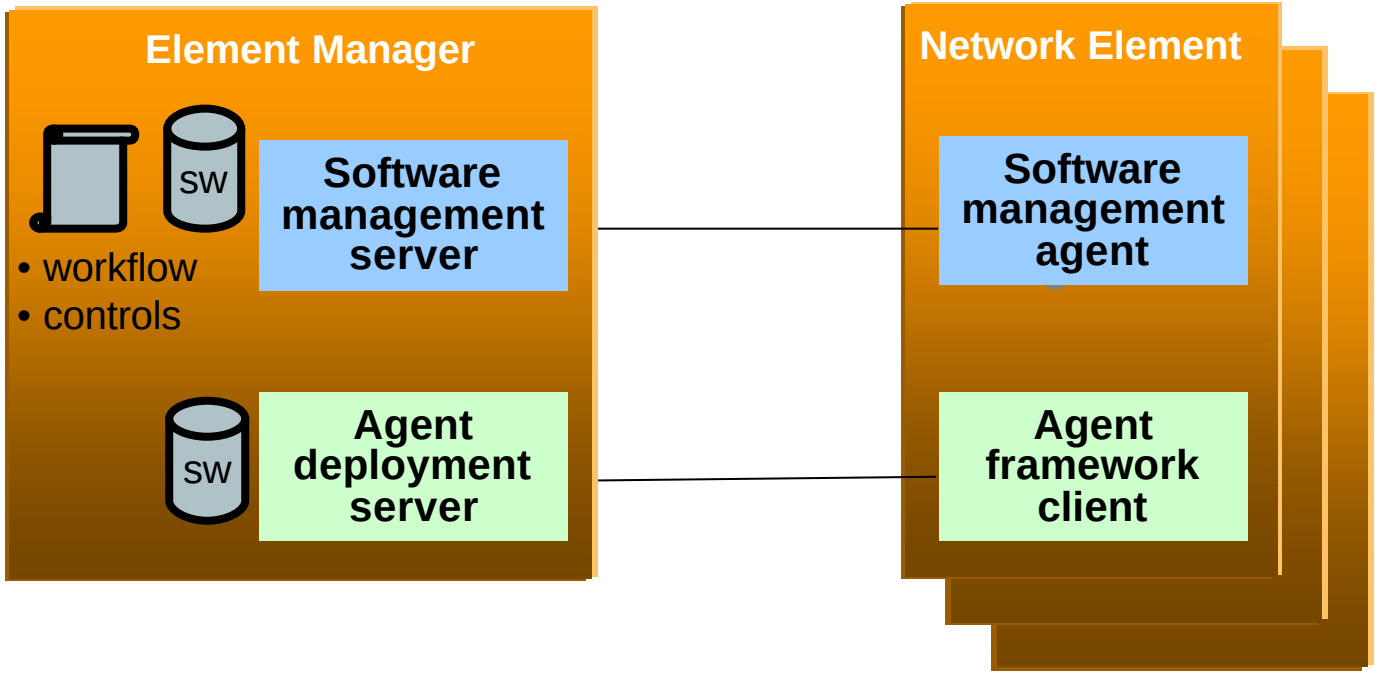
Step 2: autonomic SW management

- System can compile the workflow itself
- Scalability by NE clustering.

The proposed solution: fundamental concepts

Distributed SW management (in Network Element)

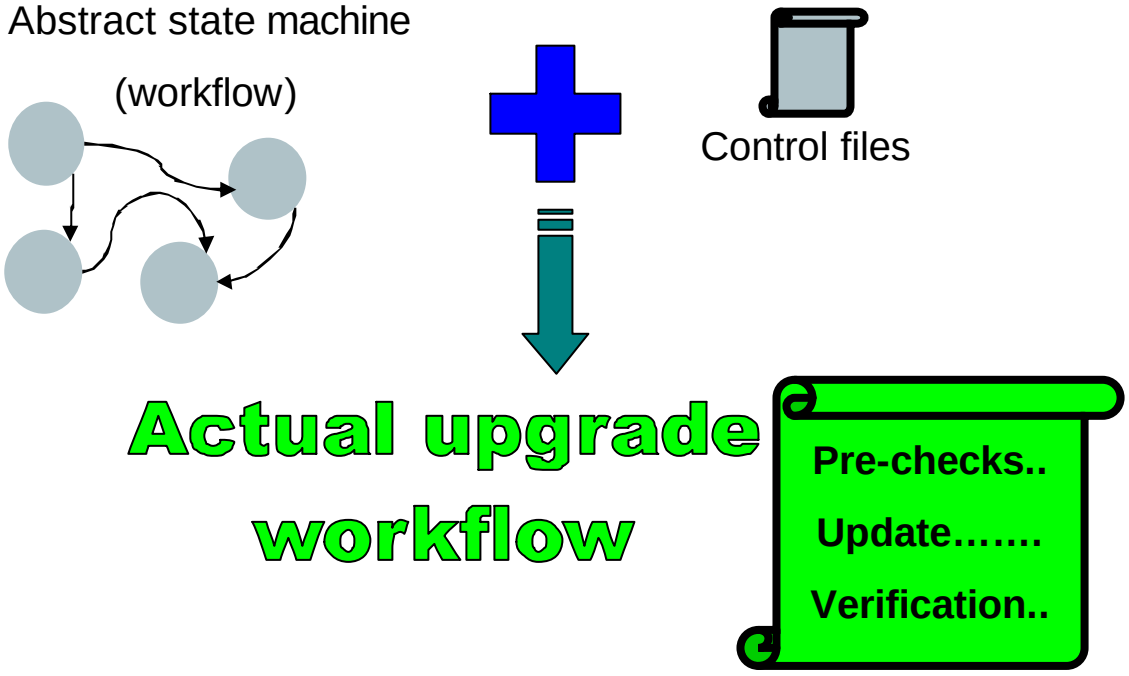
Logically centralised control (in Element Manager)



The execution of the software management procedure is controlled by **XML** based workflow and control files

The proposed solution: details

1. Trigger from the Element Manager, which downloads workflows and control files
2. The Agent customizes the workflow and executes it
3. Configuration will be updated and report sent



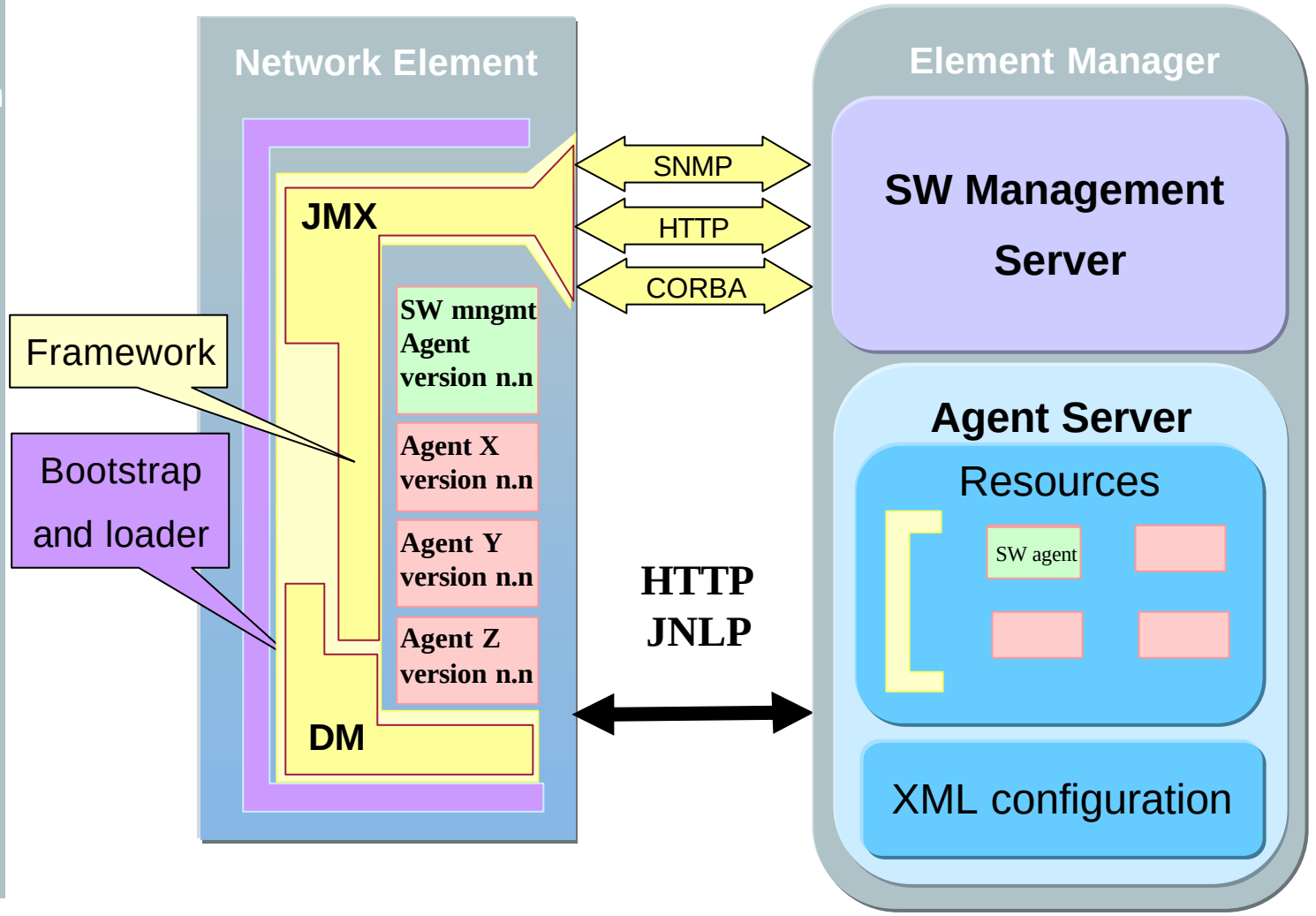
The proposed solution: the agent framework

Introduction

Proposed solution

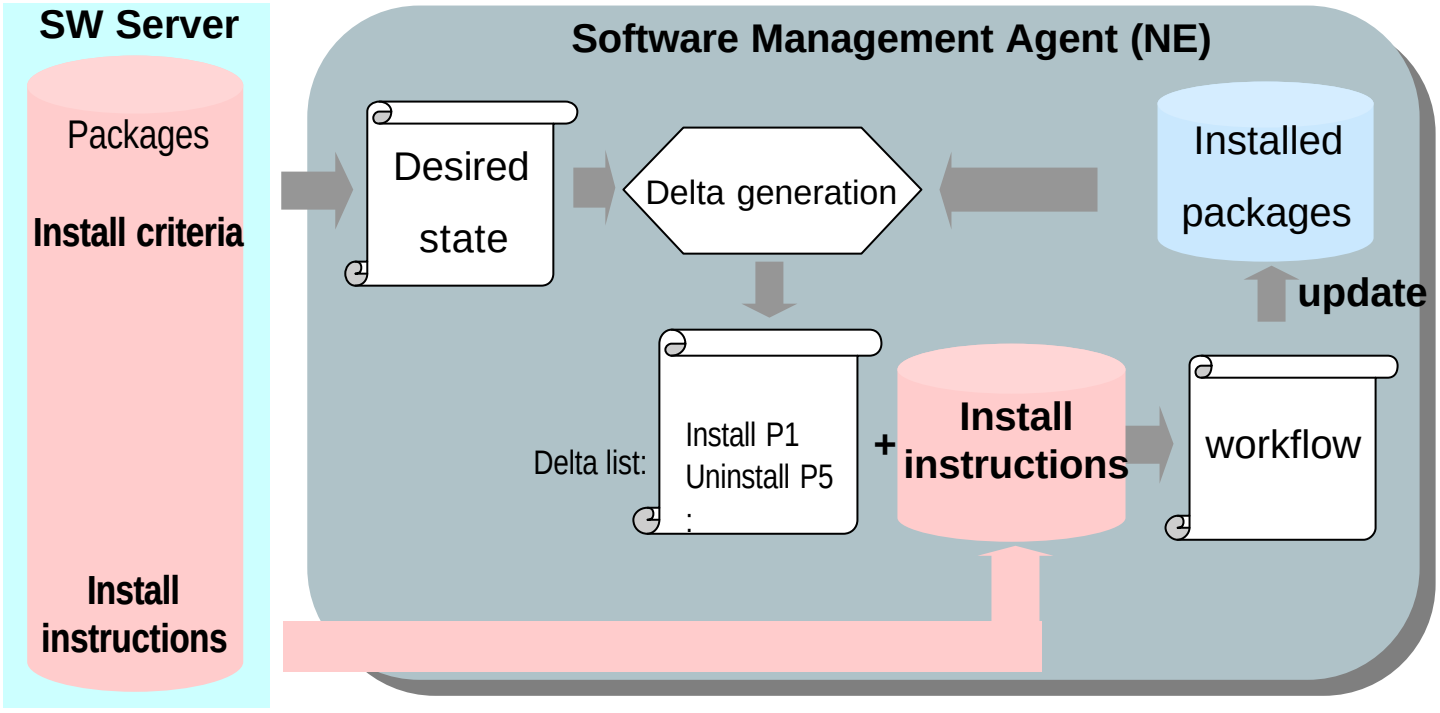
Outlook

Conclusions



The extended solution: desired state

Desired state and workflow based on meta-data



Outlook (1)

Synchronised updating in a distributed solution: inter-agent co-ordination mechanism requires

- efficiency: limited additional communication traffic,
- reliability (e.g. no deadlock)

⇨ Topic fur basic research and simulation.

Optimised update scheduling taking into account the network situation and operator policies.

⇨ Mechanism for consolidated centralised and distributed decision making needed.

Outlook (2)

Self-healing SW management to reduce manual interventions and improve update success rate.

Progress in “autonomic computing” technology is needed:

- Efficient methods for expressing rules and ontologies for decision making.
- Self-learning systems, collecting intelligence from manual interventions.

Conclusions

Distributing the execution of SW update workflows away from the NM system allows for a very **scalable and generic solution**.

Introduction of autonomic decisions and high automation

- **reduces OPEX**
- improves **reliability** of installed SW,

Self-management can be deployed for almost **any SW management task**: first installation, new releases, updates & patches

First solutions can be adopted from the IT industry, but **further research** will be needed