

## Provision of self-x functionalities in IEEE 802.16 networks

### IEEE 802.16 Presentation Submission Template (Rev. 8.3)

Document Number:

IEEE S802.16-06/027

Date Submitted:

2006-11-13

Source:

Eckard Bogenfeld, Ingo Gaspard  
Christian Esteve Rothenberg, Hans Einsiedler  
Deutsche Telekom AG  
Deutsche-Telekom-Allee 7  
D-64295 Darmstadt, Germany

Voice: +49-6151-937-5834  
Fax: +49-6151-937-4611  
E-mail: eckard.bogenfeld@t-systems.com

Venue:

November 2006, IEEE 802.16 Session #46, Dallas, TX.

Base Document:

IEEE C802.16-06/027

Purpose:

Call for discussion on provision of self-x functionalities in IEEE 802.16 networks

Notice:

This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.

Release:

The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.

IEEE 802.16 Patent Policy:

The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <<http://iee802.org/16/ipr/patents/policy.html>>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <<mailto:chair@wirelessman.org>> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <<http://iee802.org/16/ipr/patents/notices>>.

# **Provision of self-x functionalities in IEEE 802.16 networks**

Eckard Bogenfeld, Ingo Gaspard,  
Christian Esteve Rothenberg, Hans Einsiedler

Deutsche Telekom AG

# Outline.

- √ Introduction
- √ Background
- √ Benefits
- √ Basic self-x cycle
- √ Example 1: Self-configuration
- √ Example 2: Self-optimization
- √ Scope
- √ Summary

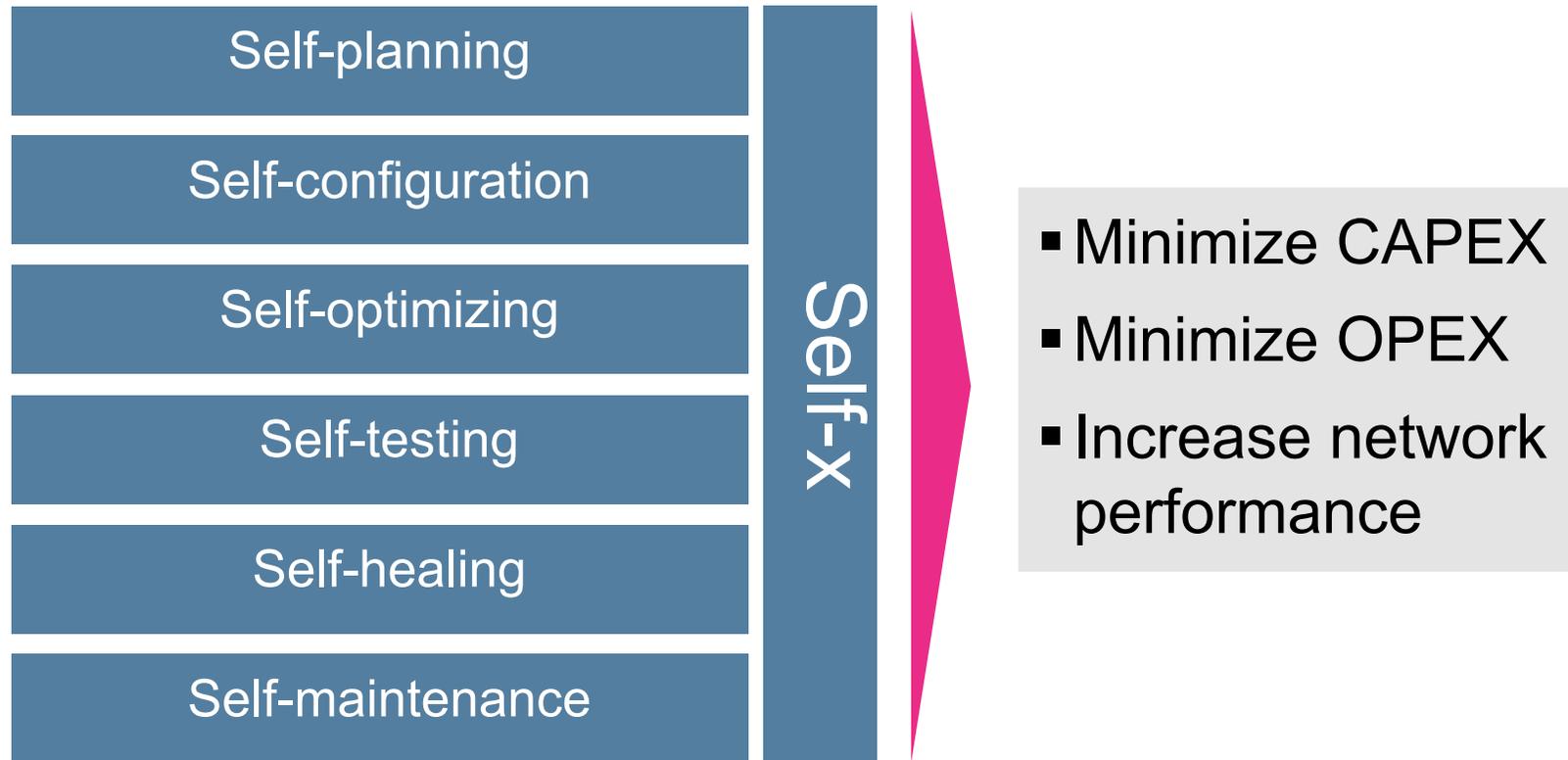
# Introduction.

Business challenges lead to the requirement of self-x functionalities.

- √ Complexity and heterogeneity of radio access networks is constantly increasing.
- √ Introduction and deployment of new wireless services and systems should be accelerated.
- √ Changing customer demands (e.g. customer density, traffic loads, ...) require adaptation of radio network configurations to optimally fulfil the customer needs.
- √ High pressure on CAPEX and OPEX
  - √ requires optimization of available resources.
  - √ requires **self-x functionalities** in radio access network infrastructures. The goal is to operate the network with a minimum number of operating staff.

# Background.

Overview of self-x functionalities.

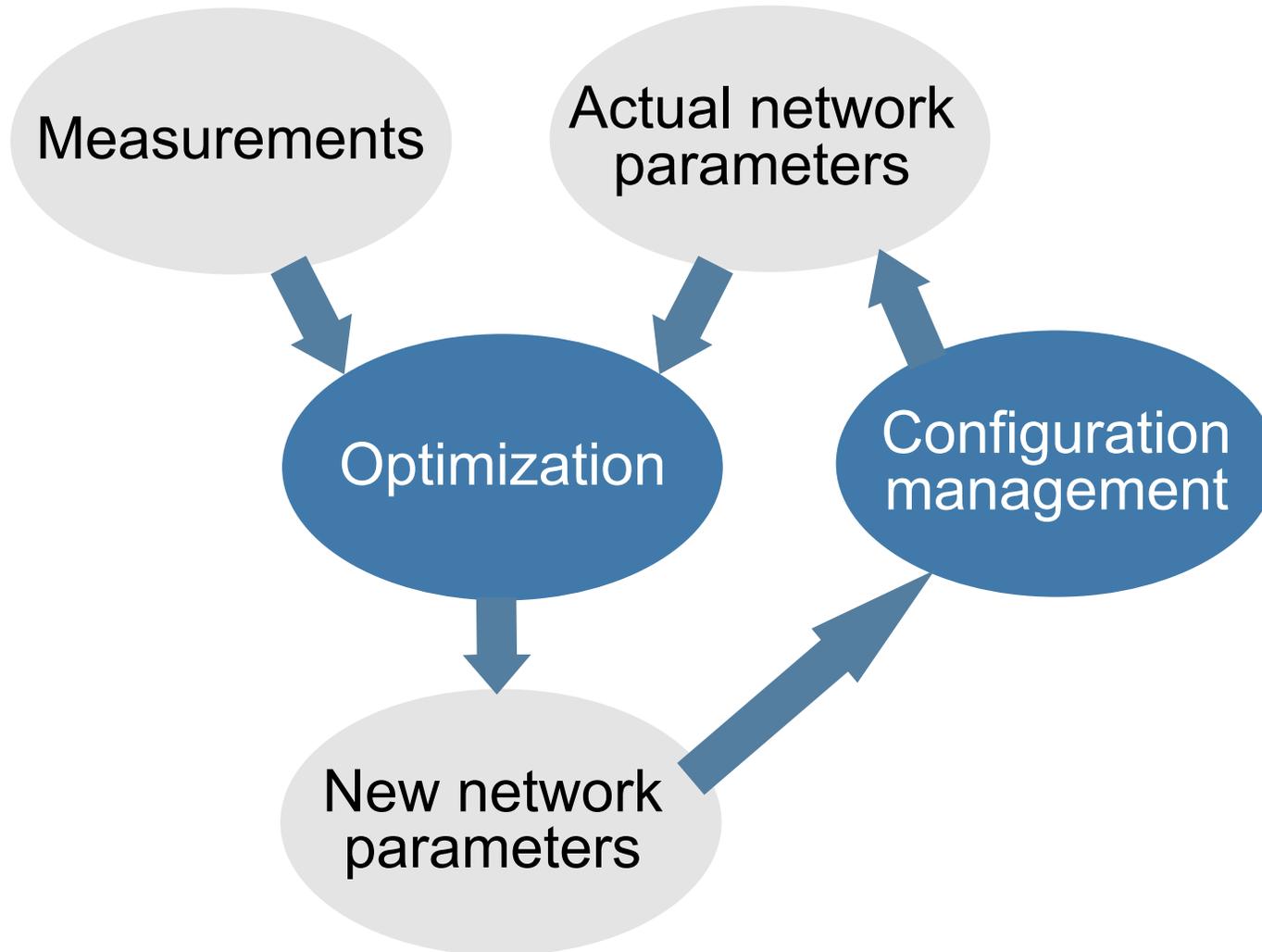


# Benefits.

Self-x functionalities are required.

- √ Reduce installation and integration time and effort.  
(e.g. fast integration of new infrastructure elements by self configuring “plug & play” base stations or relay stations).
- √ Reduce infrastructure cost.
- √ Reduce effort and time cycles for “in operation” network adaptation & optimization.
- √ Increase coverage, performance and reliability.

# Basic self-x cycle.



# Example 1: self-configuration.

**Self-configuration** can be defined as the process where a newly deployed BS is configured by automatic installation procedures to get the necessary basic configuration for system operation.

## Initial setup

- Discovery of other 802.16 entities and authentication,
- Attachment to the NCMS,
- Downloading of initial configuration SW,
- IP address configuration,
- etc.

## Radio configuration

- Neighbor BS list and further handover parameters,
- OFDM sub-tones and power control,
- Uplink and downlink parameters,
- Antenna tilting angle,
- etc.

# Example 2: self-optimization.

**Self-optimization** implies the self-tuning of relevant parameters during operation in order to adapt to the environmental changes.

## Measurement collection



Signal strength and QoS reports, capacity measurements, throughput measurement reports, etc.

## Data processing



- Algorithmic computation to process the collected data,
- Derivation of key performance indicators,
- Computation of optimized parameters, etc.

## Configuration management



- Provide the interface to configure parameters,
- Perform parameter cross-checks before actual configuration is activated, etc.

# Scope.

- √ Architecture discussion on self-x functionalities in IEEE 802.16 (centralized or decentralized).
- √ Provision of new self-x related measurements e.g. network initiated measurements, position information, etc.
- √ Provision of self-x related interfaces between IEEE 802.16 entities e.g. due to compatibility in multi-vendor environments.

# Summary.

- √ Related document: IEEE C802.16-06/027
- √ Self-x functionalities
  - √ reduce effort (CAPEX and OPEX).
  - √ increase coverage, performance and reliability.
- √ Need to discuss the provision of self-x functionalities in IEEE 802.16 networks.
- √ Let's start this discussion.