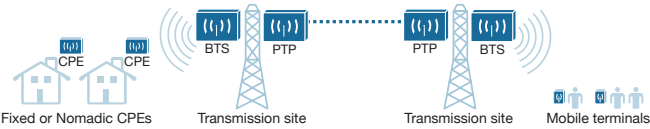


stix

A Goal-Oriented Distributed Management System For Large-Scale Broadband Wireless Access Networks

Broadband Wireless Access (BWA) Networks



- E.g., long-distance Wifi, WiMax, 3G, 4G/LTE
- Increasing number of both large-scale BWA networks and community deployments

Management Challenges

- BWA management is typically done "in-band"
- Almost all network management platforms used in practice are centralized and based on SNMP: high communication overhead and infrastructure costs
- BWA network management research focuses on self management mechanisms, but **not on platform support**
- Wireless network management is **more complex**
- Device **heterogeneity**

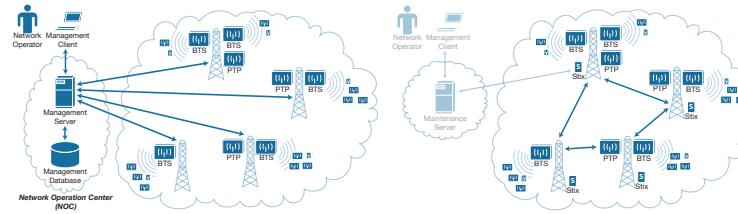
Design Goals

- To develop a network management platform for BWA networks that:
- **Simplifies network management**, especially important for community deployments and developing region settings
 - Is **scalable and robust** to suit large deployments
 - Is **flexible**, to facilitate easy realization of self-management approaches
 - Seamlessly supports **multi-vendor devices**

Our key principles

- **Goal-oriented network management**: allow network administrators to easily specify self-management operations as workflows, using a visual programming language
- **The network is the NOC**: employ a distributed cooperative agent based management architecture, for greater scalability and little or no reliance on external NOC infrastructure
- Other unique features:
 - **on demand access** to management information: StixView
 - in-network **replicated storage**: log overlay with Sprinkle mechanism
 - **hardware abstraction layer** to handle heterogeneity: device manager

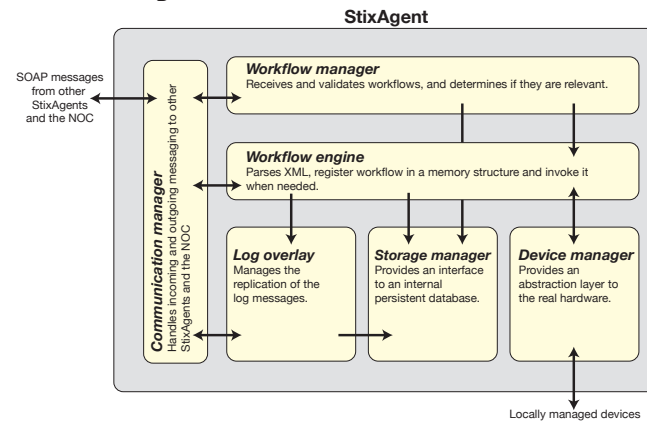
Traditional management vs. Stix architecture



The StixL Visual Programming Language

- We call "network process" each activity performed during the network lifecycle (e.g., firmware upgrades, reconfigurations, etc.)
- StixL is a visual programming language that enables network processes to be described **graphically**
- 17 language entities, with **dynamically loadable modules**

The StixAgent architecture



Implementation

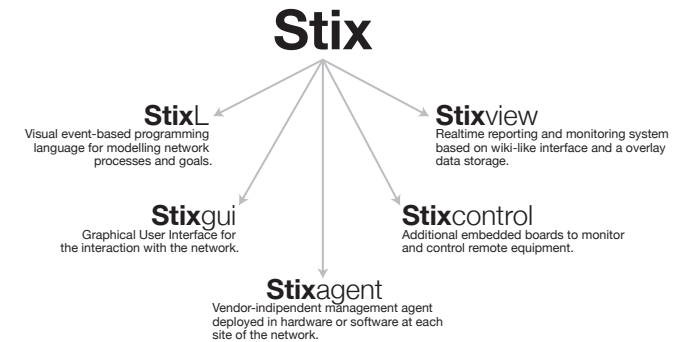


Current hardware:

- Gumstix Overo + Custom I2C board
- CPU: ARM Cortex-A8 600Mhz
- RAM: 256MB
- MicroSD slot, currently 4GB cards
- I2C and FastEthernet interfaces
- Low power requirements

Software:

- Custom Linux distribution
- Sun Oracle J2SE for Embedded 6
- HSQL database



Real-world deployment example: the Tegola testbed in rural Scotland

