Software architecture for optimal use of heterogeneous mobile communication environments

This technology is a software architecture that enables optimal Internet communication in environments comprising heterogeneous mobile devices and network technologies. The architecture consists of an enhanced network stack used by mobile nodes and a suite of network access services. The enhanced stack contains control functions that manage multiple network interfaces, make mobility decisions, allocate and share resources, and reduce the effects of disruption on user experience and communication performance/reliability. These control functions are managed by a policy-based decision-making system that determines how to switch between and/or optimally combine use of available network resources. The network-based services defined by this technology decouple services from underlying infrastructure so as to simplify use of different technologies by mobile devices that utilize the architecture. Different authentication schemes are also unified by this technology to reduce the complexity of managing credentials for different networks.

Enhanced network stack with additional control functions and decoupling of network access functionality from actual infrastructure enables seamless network transitions, robust user experience and performance in different network environments.

Mobile Internet bandwidth consumption and wireless networking technologies have grown significantly in response to increased demand for pervasive, high-quality mobile communication services by users. The profusion of different devices, different networking technologies, and network availability conditions in varying locales presents challenges in ensuring undisrupted service for mobile users and developing new communication applications and services that can operate over different networks.

This technology addresses these challenges by enabling mobile devices to decide how and when to use different available network resources in a secure manner. By providing a unified interface to different technologies and availability scenarios, the architecture significantly reduces the complexity of developing mobile communication applications that can operate in heterogeneous circumstances. Hiding different infrastructures from applications using the enhanced network stack also enables seamless transitions between networks. This technology’s policy management mechanism enables control of resource utilization in response to user
requirements and available networks. Legacy communication applications can also benefit from the architecture without modification since the latter exposes standard networking APIs.

The enhanced network stack was successfully prototyped using the Linux kernel and open implementations of protocols and frameworks required by the various layers of the stack.

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**Applications:**

- Seamless switching between different networks (e.g., cellular to WiFi) when not all are available.
- Automated simultaneous use of multiple available networks to provide increased bandwidth for multimedia communication.
- Network-enabled devices that permit transfer of communication sessions between devices.
- Services (e.g., social networking, messaging, etc.) that can be transparently used by software applications on different mobile platforms over many different types of networks.

**Advantages:**

- Improved effective coverage in areas where certain network technologies are unavailable.
- Ability to dynamically switch to regionally available wireless bandwidths to increase network capacity.
- Reduced disruptions in mobile communication sessions.
- Ability to share software services over a range of different mobile devices and network technologies.
- Reduces complexity of managing credentials in a heterogeneous network environment via a unified security framework.

**Patent information:**


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**Related Publications:**


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