NETWORKS
How the world shares ideas.

# Unified Network Presence Management

**Nortel Networks Wireless Solutions**
**Andrew Silver, John Larkins, Dave Stringer**

*A White Paper*

Abstract

In today's increasingly complex world of communications, subscribers who wish to remain in touch at all times use an increasing range of devices and networks. Subscribers faced with too many options often have difficulty communicating successfully.

A solution to this problem lies with the concept of Unified Network Presence Management in which a user's 'presence' is dynamically detected on a range of networks such that an agent can act as a personal communications manager that exploits the dynamic data trail as a user interacts with multiple communications services and devices across multiple networks.

The Unified Networks Presence Manager provides the ultimate point of access to an individual subscriber's network-wide mobility independent of the network and terminal device through which the user is connected, in order to enable the seamless delivery of services in a manner that is appropriate and customized to the subscriber.

## Introduction: Unified Network Presence Management

In today's increasingly complex world of communications, subscribers who wish to remain in touch at all times use an increasing range of devices and networks. These include fixed and mobile telephony, short messaging, paging, instant messaging, voicemail, e-mail and fax.

Subscribers faced with too many options often have difficulty communicating successfully. A caller usually has to guess which method of communication is likely to be the most appropriate for the intended recipient at a particular moment. This leads to uncompleted calls and multiple messages being left. The recipient must also struggle to monitor multiple means of communication to ensure reception of important communications, while attempting to avoid persistent interruptions.

A solution to this problem lies with the concept of Unified Network Presence Management in which a user's 'presence' is dynamically detected on a range of networks such that an agent can act as a personal communications manager that exploits the dynamic data trail as a user interacts with multiple communications services and devices across multiple networks. This presence data is interpreted by the agent to predict the best method for contacting the user at a particular moment in time, in a given location, based on the user's availability, device capability, and personal preferences.

With the evolution of communications networks towards a unified IP-based architecture, application services will be able to communicate with devices while being abstracted from the underlying networks on which the devices are currently operating. The implications of this concept of 'IP Reachability' will have far reaching effects on the evolution of Presence Services as an extension of the popular internet-based Instant Messaging to work across multiple networks and multiple devices, including computers, personal digital assistants, fixed and mobile phones, pagers and even interactive televisions.

Examples of network information that can be harvested include whether a user is logged into a networked computer, and whether that user is currently active. Another is whether a mobile phone is switched on, what network it is on, and its cellular location. A third is an electronic calendar's indication of a user's availability and location. A combination of little pieces of network information can be used to build an intelligent picture of a user's situation and accessibility.

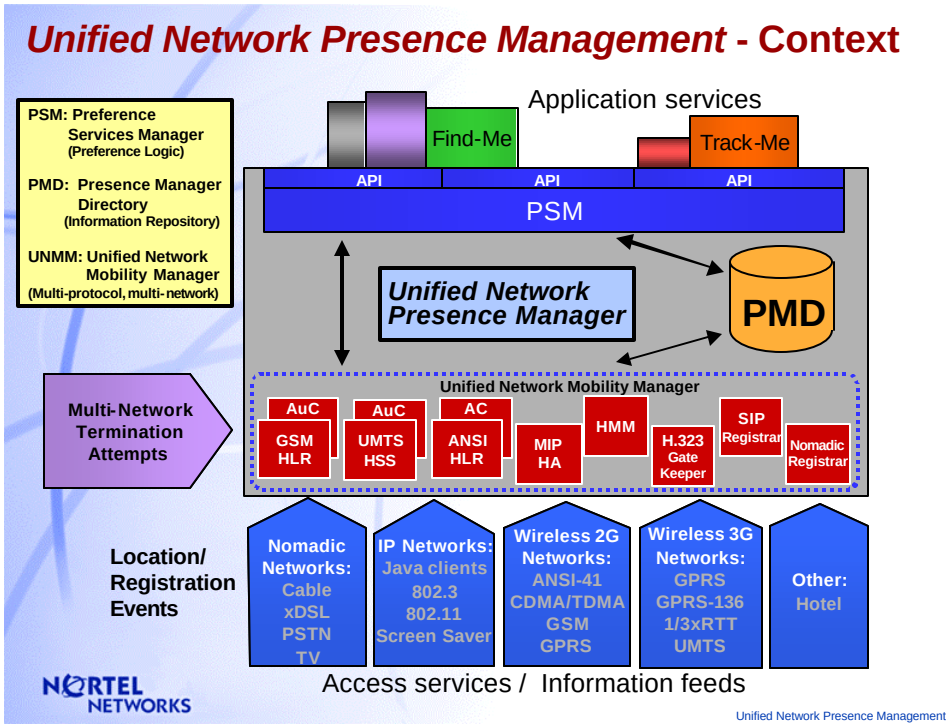
In summary, in today's increasingly complex world of communications, the concept of Unified Network Presence Management may prove to be an important means for users to manage their time and communications more effectively.

## Unified Network Presence Management Architecture

An entity's 'network presence' is constructed from a myriad of presence indicators that come from the access networks, directly from a user's terminals or from third party information feeds. These indicators are combined to form a higher-level view of presence in terms that are meaningful to a user. This

combination is done in real-time so that the entity's presence can be projected out onto the network in advance of any attempt to communicate with the entity.

The components used to achieve this concept and how they fit together are shown in the following diagram.




The Unified Network Present Management architecture consists of three main component building blocks:

**PMD**: The Presence Manager Directory represents the common repository in which all known and deduced subscriber presence information is deposited and retrieved. The PMD is the source from which services obtain through the PSM, and to which networks deposit presence information. The PMD is effectively a network directory using standardized protocols such as LDAP (Lightweight Directory Access Protocol) to which collected information is deposited and made available to authorized networks/applications via the PSM.

**PSM**: The Preference Service Manager contains the preference logic and rule-based processes that respond to network and service requests for contactability with a subscriber entity. The raw presence manager distills the flow of indicators into a more abstract "network presence". This is a rule-based process that takes into account the timing of indicators and their ability to accurately reflect an entity's state.

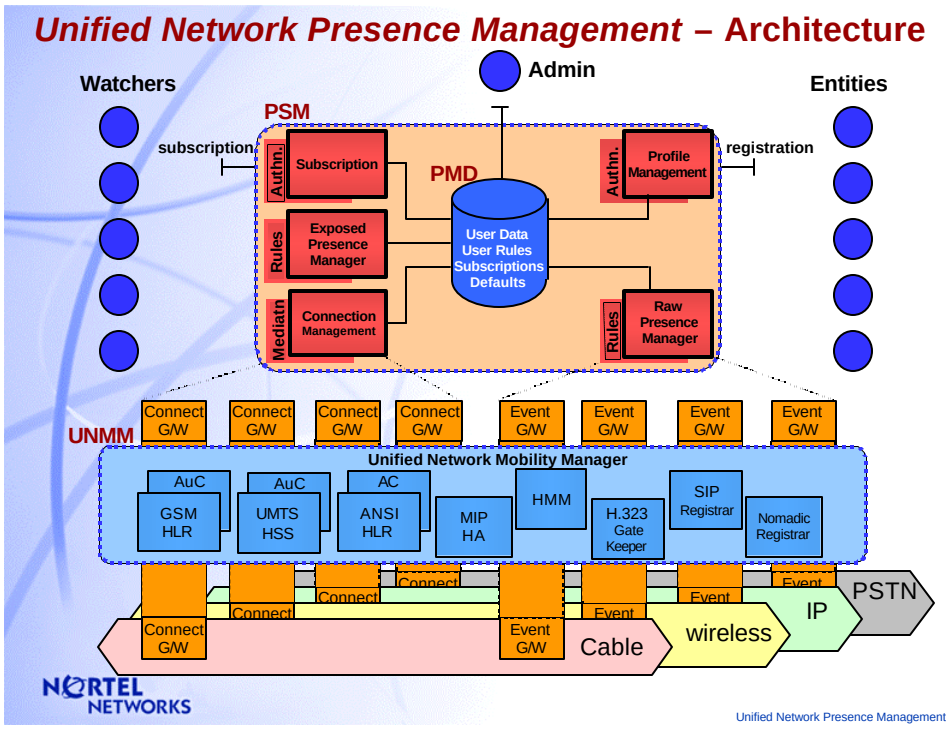
**UNMM**: The Unified Network Mobility Manager contains mobility management agents across multiple networks servicing multiple devices associated with a single subscriber entity.

These voice and data networks include classic wireless (CDMA/TDMA/GSM), next generation wireless (GPRS, 1/3xRTT, UMTS), next generation Wireless IP Mobility, and low-mobility/nomadic including wireline, cable modem, and xDSL. These networks enable the UNPM to maintain and oversee location, subscription information and termination attempts for multiple networks at once.

The UNMM is responsible for the reachability of the end user/application. In effect, it is comprised of a collection of HLRs, SIP/IP Registrars and Home Agents that, when integrated, support an upper tier of mobility management enabling ubiquitous reachability and interaction with the PSM.

**Subscription and Registration**
Initially, an entity registers with the UNMM associated with the network of attachment. The UNMM then passes this registration to the PSM which processes the location/state update logic and notifies appropriate watcher applications based on the user's predefined rules and security preferences.

Any number of watchers, representing value added application services, may subsequently subscribe to the presence of a subscriber entity via the subscription component. They can expect to receive notifications when that presence changes.




**Discovery and Contactability**
When attempting to contact a registered UNPM subscriber, the UNMM will receive the termination attempt and contact the PSM. The PSM will identify a list of networks to which the user is currently attached, and will determine the appropriate connection routing based on the customer's pre-defined preference rules. The PSM will then inform the UNMM of the preferred method of

contact, with which it will format a response appropriate for the requesting network.

Note that it is possible for the UNMM to instruct the originating network to redirect the call to another network type, for example from a GSM cellular phone (which was dialed by the calling party) to a SIP session on the called party's PC.

**Service Interfaces**

There are a number of possible interface protocol mechanisms for the presence change notification. The most prevalent of these is the AOL Instant Messenger protocol. In addition, the IETF is working towards a standard protocol called IMPP, Instant Message and Presence Protocol.

Extending this concept to generalized APIs allows the information to be formatted into standardized form, taking advantage of platform independent software development environments, namely Java. With Java API procedure calls, watcher applications can subscribe to and be informed of presence information events through a standardized and published interface.

**Sourcing of Presence information**

Presence indicators are generated for the Unified Network Presence Manager from three general sources.

The first source is from access networks through event gateways into the UNMM, as a side effect of an entity's normal utilization of those networks - for example, a standard Power Up registration on a GSM network when the phone is activated.

A second source arises directly from presence clients that reside on an entity's terminals, for example on a PC, WAP (Wireless Application Protocol) phone, or a Java-enabled terminal supporting J2ME (Java 2 Micro Edition). Much potential of this solution lies with the Third Generation cellular network enabling of IP communications combined with the introduction and anticipated adoption of J2ME in mobile terminal devices.

A third source of indicators is third party services, such as a hotel registration system that can generate an indicator as a side effect of a guest registering upon arrival. All of these indicators are delivered via event gateways into the Unified Network Presence Manager via the UNMM.

Putting these information components together, the raw presence manager distills the flow of indicators into a more abstract "network presence". This is a rule-based process that takes into account the timing of indicators and their ability to accurately reflect an entity's state. Any change in an entity's network presence causes the exposed presence manager to re-evaluate any outstanding subscriptions and to notify qualifying watchers of the new presence.

**Presence Exposure**

An entity may project a different presence to different watchers. The rules that underpin the exposed presence manager define what presence information is projected to which watchers. In order that an entity's privacy is protected and that certain information is only presented to specific watchers, the subscription component relies upon authentication of the watcher.

The presence information notified to watchers allows them to initiate communication with an entity based on the presence information received. This may either be directly over an access network, representing a termination attempt into the UNMM, or it may be via a connect gateway and the connection management component. A brokered connection might be used to support anonymity or content mediation.

Unified Network Presence Management extends the current notions associated with instant messaging over the internet in several dimensions. Unification over a number of discrete access networks makes it possible to leverage information about a user operating in one network to manage communications over another network. The style of communication is also extended from just instant messaging to cover deferred messaging (e-mail and voice-mail) and two-way conversations. This allows fine-grained control where a potentially intrusive communication is relegated to one of a less intrusive style.

## Conclusion

In today's increasingly complex world of communications, the concept of Unified Network Presence Management may well prove to be an important means for users to manage their time and communications more effectively.

In addition to bringing the increasing complexity of communication under user control, supporting the benefits of privacy, anonymity and improved reachability, presence will become a springboard for the provisioning of new third party services. The Unified Network Presence Management architecture will be a powerful enabler for unifying the next generation of services across multiple networks and multiple devices for a single subscriber.