HOME NETWORK AND HUMAN INTERACTION SYSTEM

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Keywords: Network, human system, mobility system.

Abstract: The term security network intelligence is widely used in the field of communication security network. A number of new and potentially concepts and products based on the concept of security network intelligence have been introduced, including smart flows, intelligent routing, and intelligent web switching. Many intelligent systems focus on a specific security service, function, or device, and do not provide true end-to-end service network intelligence. True security network intelligence requires more than a set of disconnected elements, it requires an interconnecting and functionally coupled architecture that enables the various functional levels to interact and communicate with each other.

1 INTRODUCTION

The study of security network intelligence is an extremely active area in the field of communications. Thanks to the latest advances in data communications – especially in the services sector and in the communications software, photonics, and programmable technologies areas – service providers are spending millions of dollars a year on an increasingly intelligent communication infrastructure and applications. Research in the areas of learning automata, intelligent agents technologies, intelligent data-mining, knowledge discovery, data-driven task sequencing, intelligent databases, wire-speed real-time databases, virtual modelling, and sophisticated communication network modelling has provided insights into intelligent computing processes. Significant progress has been made in rule-based reasoning, planning, and problem solving.

Future generation networking will be characterized by the need to adapt to the demands of agile networking, which include rapid response to changing customer requirements, automated design and engineering, lower-cost services, transparent distributed networking, resource allocation on demand, real-time planning and scheduling, increased quality, reduced tolerance for error, and in-process measurement and feedback. Future networking systems will require automated intelligent networking features that apply intelligence to the domain of networking in such a way as to make possible the realization of a full range of agile and adaptable networks.

Cable operators will have to face the commercial and operational strategy for:

- Building out or upgrading to bi-directional (two way) networks,
- Offering voice telephony to residential and business consumers,
- Offering multi-channel digital television,
- Video-on-demand,
- Home shopping,
- Home banking,
- Residential and business telephony,
- High-speed Internet,
- Home security.

The distributed interactive information system can be structured in a hierarchical way for system scalability and evolution – Figure 1, Figure 2. It can start from an initial two level system with a central information server and several local information servers to a system with as many levels of the hierarchy as needed. The number of levels needed depends on the network size, network costs, and network performance requirements.

Volner R. (2007).
HOME NETWORK AND HUMAN INTERACTION SYSTEM.
In *Proceedings of the Ninth International Conference on Enterprise Information Systems - HCI*, pages 323-327
DOI: 10.5220/0002400103230327

2 INTELLIGENT SECURITY AND COMMUNICATION NETWORKS

Intelligent security and communication networks must at least be able to understand the security and communication environment, to make decisions, and to use and manage network resources efficiently. More sophisticated levels of security network intelligence include the ability to recognize user, application, service provider, and infrastructure needs, as well as expected and unexpected events, the ability to present knowledge in a world model, and the ability to reason about and plan for the future.

Network intelligence will evolve through growth in computational power and through the accumulation of knowledge about the types of input data needed for making decisions concerning expected response, and about the algorithmic processing required in a complex and changing communications environment. Increasingly sophisticated network intelligence makes possible look-ahead planning, management before responding and reasoning about the probable results of alternative actions. These intelligent network capabilities can provide service providers with competitive and operational advantages over traditional networks.

3 THE HS/ATM ARCHITECTURE

For a network, the serving area is partitioned into a number of basic service areas designated as cells. Each cell is served by a base station – centre HS, which exchanges radio signals with mobile terminals – home control centers. Mobility is central to networks. To provide mobility, tracking mobile terminal locations becomes an important and primary function of network and hence some databases are introduced to support such a capability. In HS/ATM networks, each HS network covers a large geographical area and incorporates a number of base stations. Meanwhile, the location database of wireless cluster manager is broken into two parts:

- one for the mobile terminals which are permanently registered in the community, the home community – home part,
- the other for the mobile terminals which are visiting the community – visiting part.

4 MODELS OF MOBILITY

Mobility models describe a mobile unit's movement through a geographical area. A number of systematic and ad hoc models have appeared in the literature, but they do net reflect realistic actual movement patterns in many respects. Nor, being idealizations for specific purposes, are they intended to describe adequately the range of subscriber behaviours that will appear in a mobile multimedia network covering a large geographical area.
The mobile VCE (The Virtual centre of Excellence in Mobile and Personal Communications) model consists of a series of poles - places where mobile users gather, such as a city centre, a shopping mall or a road (hence the need to include direction). Movement between poles is defined by four properties, which between them determine the spatial and temporal behaviours of the users:

- gravity, reflecting the attraction to a pole,
- elasticity, reflecting the reaction of restoring equilibrium after changes of attraction,
- entropy, modeling the disorder at poles and in the flows between them,
- viscosity, representing the spatial spreading variations of the flow populations.

The model is a network of poles through which circulates a population of mobiles, whose velocity is determined by the configuration of the above four elements. A mobile can be seen either as an individual or as a mass. Every mobile belongs to a specified mobility class, of which there are four:

- business,
- leisure,
- shopping,
- residential.

As shown in Figure 4, the model can be decomposed into three distinct sub-models:

- the physical sub-model defines the topology and the quantitative spatial distribution of the mobiles,
- the gravity sub-model controls the temporal evolution of the attraction of all the poes,
- the fluid sub-model fixes the laws of circulation of each mobile between the poles.

5 CHARACTERIZATION OF SERVICES, TRAFFIC SOURCES AND SYSTEM TELETRAFFIC

Traditional traffic modeling of data sources assumed that the inter-arrival times of traffic packets were basically exponential in distribution and independent of one another, which means that the process is memory-less. However, recent studies of the behaviour of individual multimedia sources and system-level activity show that traffic traces are distributed in ways more complex than this.

Our analysis has aimed at improving the best-fitting model for a given traffic scenario when the underlying flow keeps changing over time and space. To be confident that the results are useful a model was sought that:

- was as simple as possible in a computational sense without compromising accuracy,
- had a physical explanation in the network context,
- can be related to real measurements for verification purposes by the operators.

The investigation focused on extensions that could retain tractability, in two steps as described below:

- statistical multiplexing,
- parameterization.

Traffic generation – if the traffic is memory-less, generation of traffic to support the simulations can be achieved simply by a negative exponentially distributed process to specify packet inter-arrival time. However, modeling self-similar traffic is much more complex (Volner, 2003), (Volner, 1995), (ATM, 1996).

6 CONCLUSION

In this paper, we have proposed a HS/ATM network for supporting multimedia communication to mobile terminals. Here the network is partitioned into core and edge networks. The advantage of this portioning has been discussed. The network bandwidth is allocated in such a way that each VP is semi-permanently allocated a certain amount of using existing optimization techniques. Cell scheduling and queuing implementations were discussed. We conclude, that based on the proposed bandwidth management framework, all ATM service classes can be served with reasonable QoS guarantees, the CAC procedures easily implemented, and potential rate-based ABR congestion control easily incorporated.

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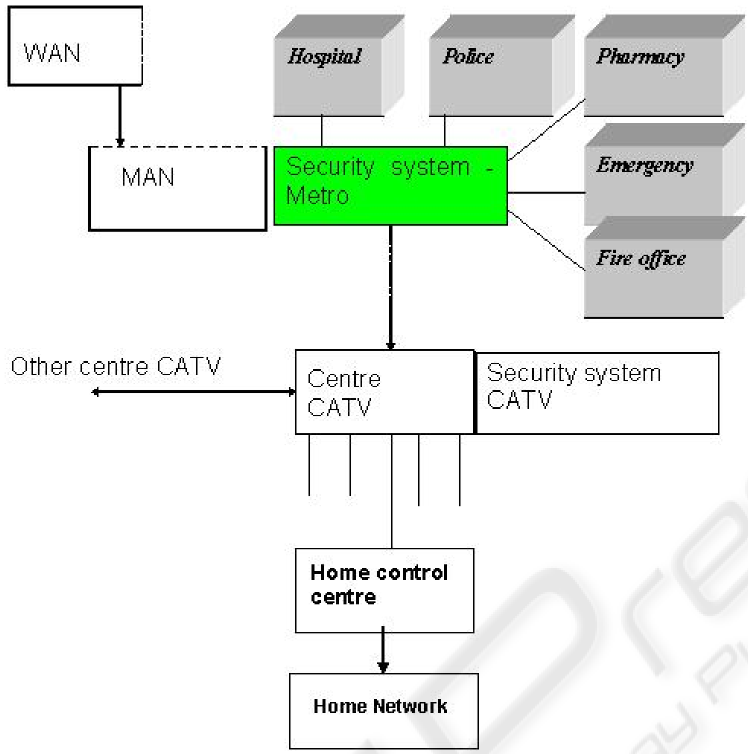

Figure 1: Basic home network – human interactive Subsystem.

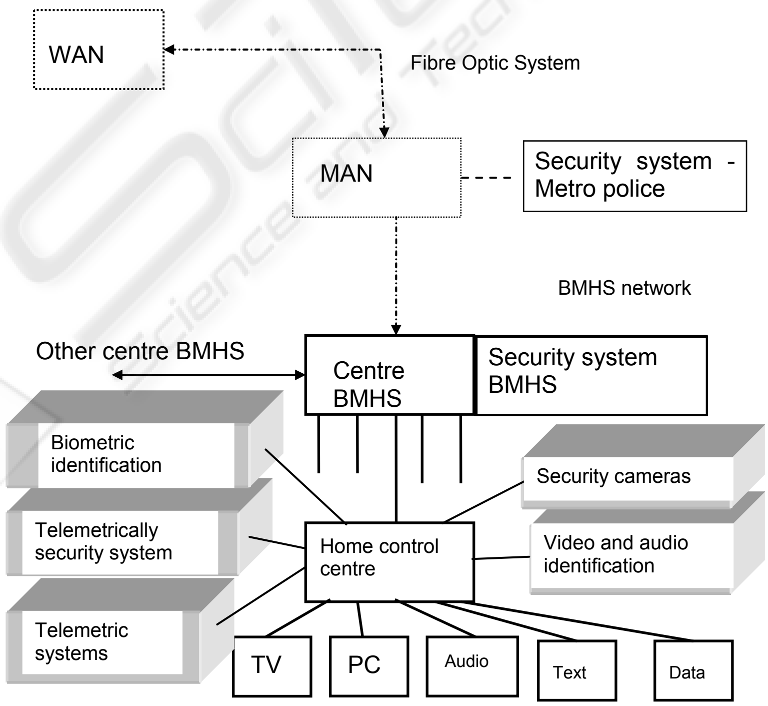

Figure 2: The HS interactive system can be structured in a hierarchical way for system scalability and evolution.

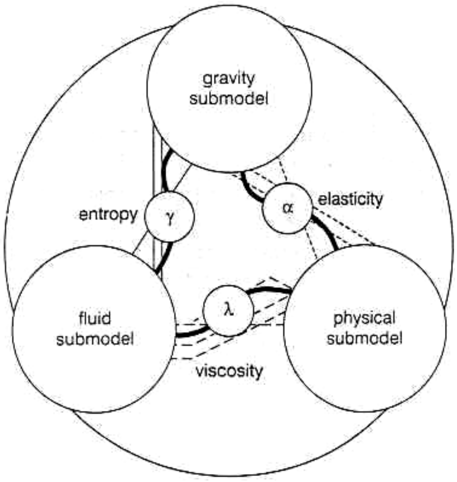

Figure 3: Mobility model into three sub-models.

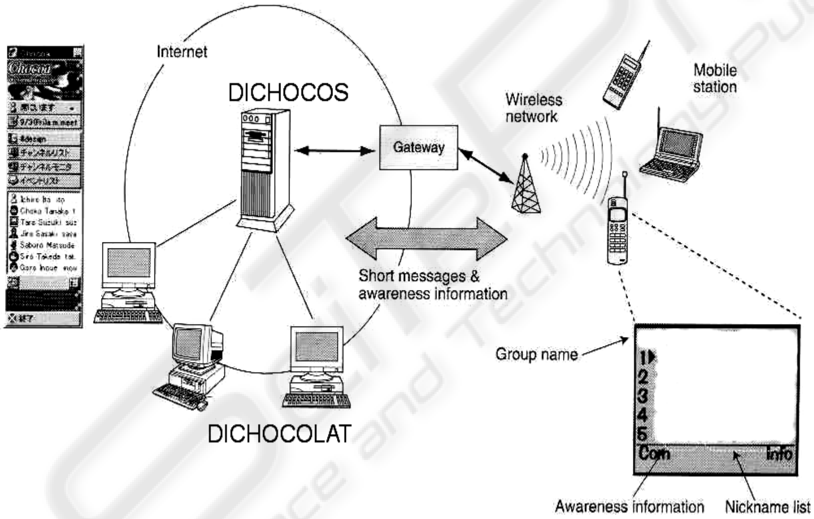

Figure 4: Mobile awareness service.