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Enhanced Wireless Autarchic Load Sharing in Network Processor

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Abstract: Even though many solutions for WMNs to recover from wireless link failures have been proposed, they still have several limitations as follows. First, resource-allocation algorithms can provide (theoretical) guidelines for initial network resource planning. However, even though their approach provides a comprehensive and optimal network configuration plan, they often require "global" configuration changes which are undesirable in case of frequent local link failures. To overcome the above limitations, researchers propose an Autarchic Load Sharing System (ALSS) that allows a autarchic load sharing which allows reconfigure its local network settings assignment for real-time recovery from link failures. In its core, ALSS is equipped with a reconfiguration planning algorithm that identifies local configuration changes for the recovery while minimizing changes of healthy settings.

Key words: Autarchic Load Sharing System (ALSS), autarchic network, QoS, core, optimal network

INTRODUCTION

Wireless networks provide unprecedented freedom and mobility for a growing number of laptop and (Personal Digital Assistant) PDA users who no longer need wires to stay connected with their workplace and the internet (Pfoser and Jensen, 1999; Gedik and Liu, 2004). The devices that provide wireless service to these clients need lots of wiring themselves to connect to private networks and the internet. This white paper presents (Beckmann *et al*., 1990; Benetis *et al*., 2002; Cai *et al*., 2004) a viable alternative to all those wires-the wireless mesh network. Unlike basic Wi-Fi that simply untethers the client (Babu and Widom, 2001; Broch *et al*., 1998). The wireless mesh untethers the network itself giving IT departments, network architects and systems integrators unprecedented freedom and flexibility to build out networks in record time with high performance and without the expensive cabling (Chen *et al*., 2000; Chon *et al*., 2003).

A Wireless Mesh Network (WMN) is a communications network made up of radio nodes organized in a mesh topology. Wireless mesh networks often consist of mesh clients, mesh routers and gateways. The mesh clients are often laptops, cell phones and other wireless devices while the mesh routers forward traffic to and from the gateways which may but need not connect to the Internet. The coverage area of the radio nodes working as a single network is sometimes called a mesh cloud as shown in Fig. 1. Access to this mesh cloud is dependent on the radio nodes working in harmony with each other to create a radio network.

A mesh network is reliable and offers redundancy. When one node can no longer operate, the rest of the nodes can still communicate with each other, directly or through one or more intermediate nodes. The animation illustrates how wireless mesh networks can self form and self heal (Beresford and Stajano, 2003; Cheng *et al*., 2004; Gedik and Liu, 2005). Wireless mesh networks can be implemented with various wireless technology including 802.11, 802.15, 802.16 cellular technologies or combinations of more than one type.

Wireless Mesh Networks (WMNs) are being developed actively and deployed widely for a variety of applications such as public safety, environment monitoring and citywide wireless internet services (Chen and Cheng, 2007). They have also been evolving in various forms (e.g., using multiradio/channel systems to meet the increasing capacity demands by the above mentioned and other emerging applications (Ghinita *et al*., 2007a, b).

However, due to heterogeneous and fluctuating wireless link conditions, preserving the required performance of such WMNs is still a challenging problem (Chow *et al*., 2006; Gedik and Liu, 2008). For example, some links of a WMN may experience significant channel

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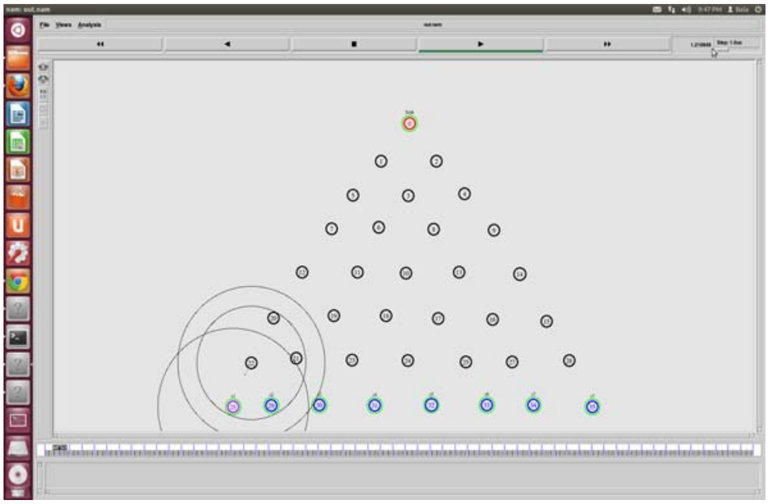

Fig. 1: Network primary structure

interference from other coexisting wireless networks. Some parts of networks might not be able to meet increasing bandwidth demands from new mobile users and applications. Links in a certain area (Broch *et al.*, 1998) might not be able to use some frequency channels because of spectrum etiquette or regulation (Hjaltason and Samet, 1999).

AUTARCHIC LOAD SHARING

- An Autarchic Load Sharing Network Reconfiguration System (ALSS) that enables a multi-radio WMN to autarchic load sharingly recover from wireless link failures
- ALSS generates an effective reconfiguration plan that requires only local network configuration changes by exploiting channel, radio and path diversity
- ALSS effectively identifies reconfiguration plans that satisfy applications' QoS constraints, admitting up to two times more flows than static assignment, through QoS aware planning
- If any failure occur, it will automatically reconfigure the node to rectify the problem and each nodes are behave independently and direct communication with the base station

SYSTEM DESIGN AND DEVELOPMENT

Observation of the current work situation will provide clues to problems and atmosphere. Record searching, special purpose records and sampling will give quantitative information about the system which facilitates sizing of the proposed system and may also point the areas of difficulties which are being experienced. Questionnaires can be used to collect the quantifiable data about the system. All of the techniques need to be supplemented by more detailed discussion of the interview situation. The identification of the user requirements, decision areas, objectives and responsibilities for certain procedures can only be achieved for interviewing.

Based on the above fact finding techniques, it is observed the current situation of the existing system. It is very helpful to finding the areas of difficulties which are being experienced in the existing system. Thus, it helps to develop the proposed system with the quantifiable data.

INPUT DESIGN

Input design is part of overall system design which requires very careful attention. If the data going into the system is incorrect then the processing and output will magnify these errors. The inputs in the system are of three types:

- External: which are prime inputs for the system
- Internal: which are user communication with the system
- Interactive: which are inputs entered during a dialog with the computer

Figure 2 enriches the proposed system with numerous facilities that make it more advantageous in comparison with the exiting normal system. All the inputs entered are completely raw, initially before being entered into a database each of them available processing. The input format in this system has been designed with the following objectives in mind.

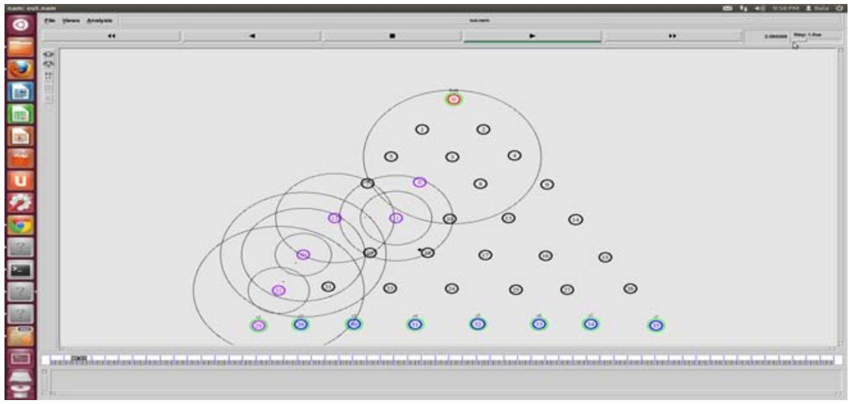

Fig. 2: Structure of autarchic network

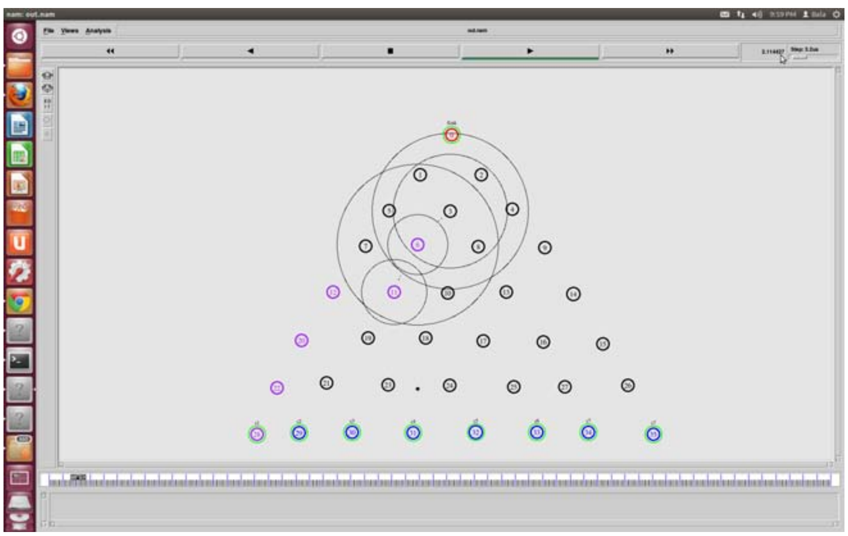

Fig. 3: Working of autarchic network

FEASIBILITY ANALYSIS

All projects are feasible given unlimited resources and infinite time (Gruteser and Grunwald, 2003; Guttman, 1984). Before going further in to the steps of software development, the system analyst has to analyze whether the proposed system will be feasible for the organization and must identify the customer needs. The main purpose of feasibility study is to determine whether the problem is worth solving. The success of a system is also lies in the amount of feasibility study done on it. Many feasibility studies have to be done on any system.

OPERATIONAL FEASIBILITY

During feasibility analysis, operational feasibility study is a must. This is because according to software engineering principles, operational feasibility or in other words usability should be very high. A thorough analysis is done and found that the system is operational using Fig. 3.

TECHNICAL FEASIBILITY

The system analyst to check the technical feasibility of the proposed system. Taking account of the hardware it is used for the system development, data storage, processing and output makes the technical feasibility assessment (Hu *et al*., 2005; Iwerks *et al*., 2003). The system analyst has to check whether the company or user who is implementing the system has enough resource available for the smooth running of the application. Actually, the requirements for this application are very less and thus it is technically feasible.

Fig. 4: Data sharing in load sharing NPU mapping and autarchic load sharing vs. time

The feasibility is also analyzed using different load condition the autarchic load sharing, load sharing is compared with load sharing and the with respect to time. In the Fig. 4, x-axis represents time and y-axis represents data sharing in packets. The graph represents by green line shows that after the self configurable network is formed the data transmission in sharing a effect of 4% average rise.

CONCLUSION

An Autonomous Network Reconfiguration System (ALSS) that enables multiradio WMN to autonomously recover from wireless link failures. ALSS generates an effective reconfiguration plan that requires only local network configuration changes by exploiting channel, radio and path diversity. Furthermore, ALSS effectively identifies reconfiguration plans that satisfy applications QoS constraints, admitting up to two times more flows than static assignment through QoS aware planning. ALSS's online reconfigurability allows for real-time failure detection and network reconfiguration thus improving channel efficiency.

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