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Literature Survey of WATM

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Abstract :ATM (Asynchronous Transfer Mode) has been advocated as an important technology for all types of services and networks. Most people believe that ATM will be the standard for the future B-ISDN (Broadband Integrated Services Digital Network). To ensure the success of ATM, lots of the design issues have been standardized by ATM Forum. Due to the success of ATM on wired networks, wireless ATM (WATM) is a direct t result of the ATM "everywhere" movement. While ATM supports for different traffic characteristics and QOS requirements, WATM networks provide wireless extension to the ATM-based B-ISDN networks by adding mobility support functions. This paper reviews the important aspects of wireless ATM and the handoff related issues. It reviews the basic concepts and benefits of ATM. Then the important features of WATM, service models, protocol model, the key characteristics of WATM and the global activities on WATM are dealt. The paper focuses on the survey of Handoff techniques in WATM and related issues. The Handoff requirements, various strategies and open issues are discussed.

Keywords : ATM, wireless ATM,B-ISDN, location management; Handoff; QoS,service model,protocol model, etc

1. INTRODUCTION.

The next generation of computer and telecommunication networks will use the asynchronous transfer mode (ATM). ATM networks use small fixed size cells to transmit information. This allows them to share the same network for voice, video, and data at a wide range of distances. Most computer and telecommunication companies are working on ATM products and services. . The ATM Forum are currently involved in defining the baseline of WATM system. The specification for both mobility control in ATM infrastructure networks, and seamless radio extension of ATM to mobile devices are under development. The ATM is viewed as the next generation high speed integrated network paradigm, supporting different classes of traffic and providing quality of service (QoS). Mobile communications have evolved and created a significant impact on the way of work and communication. The convergence of mobile communications, computing and ATM gave rise to Wireless ATM (WATM) networks. The implementation of wireless ATM presents a number of technical challenges that need to be resolved.

1. The need for the allocation and standardization of appropriate radio frequency bands for broadband communications.

2. Requirements of new radio technology and access methods for high speed operation.

3. Location management for tracking mobile terminals as they move around the network.

4. Handoff management for dynamic reestablishment of virtual circuits to new access points while ensuring sequenced and loss-free delivery of ATM cells.

5. End-to-end QoS provisioning, which is challenging in case of limited bandwidth, time-varying chan-nel characteristics and terminal mobility.

2. OVERVIEW OF ATM NETWORKS

2.1 BASIC PRINCIPLES OF ATM NETWORKS

ATM operates at the data link layer (Layer 2 in the OSI model) over either fiber or twisted-pair cable. ATM differs from more common data link technologies like Ethernet in several ways. For example, ATM utilizes no routing. Hardware devices known as *ATM switches* establish point-to-point connections between endpoints and data flows directly from source to destination. Additionally, instead of using variable-length packets as Ethernet does, ATM utilizes fixed-sized cells. *ATM cells* are 53 bytes in length, that includes 48 bytes of data and five (5) bytes of header information.

The performance of ATM is often expressed in the form of OC (Optical Carrier) levels, written as "OC-xxx." Performance levels as high as 10 Gbps (OC-192) are technically feasible with ATM. More common performance levels for ATM are 155 Mbps (OC-3) and 622 Mbps (OC-12).

ATM technology is designed to improve utilization and quality of service (QoS) on high-traffic networks. Without routing and with fixed-size cells, networks can much more easily manage bandwidth under ATM than under Ethernet, for example. The high cost of ATM relative to Ethernet is one factor that has limited its adoption to backbone and other high-performance, specialized networks.

ATM operates as a channel-based transport layer, using virtual circuits (VCs). This is encompassed in the concept of the Virtual Paths (VP) and Virtual Channels. Every ATM cell has an 8- or 12-bit **Virtual Path Identifier** (VPI) and 16-bit **Virtual Channel Identifier**(VCI) pair defined in its header.The VCI, together with the VPI, is used to identify the next destination of a cell as it passes through a series of ATM switches on its way to its destination. The length of the VPI varies according to whether the cell is sent on the user-network interface (on the edge of the network), or if it is sent on the network-network interface (inside the network).

As these cells traverse an ATM network, switching takes place by changing the VPI/VCI values (label swapping). Although the VPI/VCI values are not necessarily consistent from one end of the connection to the other, the concept of a circuit *is* consistent (unlike IP, where any given packet could get to its destination by a different route than the others).[8] ATM switches use the VPI/VCI fields to identify the Virtual Channel Link (VCL) of the next network that a cell needs to transit on its way to its final destination. The function of the VCI is similar to that of the data link connection identifier (DLCI) in frame relay and the Logical Channel Number & Logical Channel Group Number in X.25.

Another advantage of the use of virtual circuits comes with the ability to use them as a multiplexing layer, allowing different services (such as voice, Frame Relay, n* 64 channels, IP). The VPI is useful for reducing the switching table of some virtual circuits which have common paths

2.2 Benefits of ATM:

ATM provides a flexible and scalable solution to the increasing need for quality of service in networks where multiple information types (such as data, voice, and real-time video and audio) are supported. With ATM, each of these information types can pass through a single network connection.

ATM can provide the following benefits:

- High-speed communication
- Connection-oriented service, similar to traditional telephony
- Fast, hardware-based switching.
- A single, universal, interoperable network transport.
- A single network connection that can reliably mix voice, video, and data.
- Flexible and efficient allocation of network bandwidth.

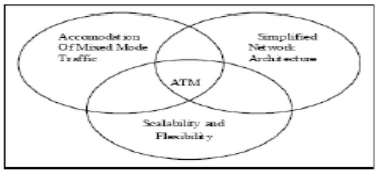

Fig 1: Advantages of ATM.

3. Wireless ATM or Mobile ATM

While ATM is a great technology for high speed networks, the wireless version of it takes the form of Wireless ATM[17] or Mobile ATM. Basically, the core network is ATM while the access network is wireless. ATM cells are still being transmitted from base stations to mobile terminals. Mobility functions are performed at an ATM switch in the core network, known as "crossover switch",[18] which is similar to the MSC (mobile switching center) of GSM Networks. The advantage of Wireless ATM is its high bandwidth and high speed handoffs done at Layer 2. In the early 1990s, Bell Labs and NEC[19] Research Labs worked actively in this field. Andy Hopper fromCambridge University Computer Laboratory also worked in this area.[20] There was a Wireless ATM Forum formed to standardize the technology behind Wireless ATM Networks. The forum was supported by several telecommunication companies, including NEC,Fujitsu, AT&T, etc. Mobile ATM aimed to provide high speed multimedia communications technology, capable of delivering broadband mobile communications beyond that of GSM and WLANs.

3.1 WATM network model

Wireless ATM is an emerging network technology that combines the multi-service, multimedia capabilities of ATM with user mobility and wireless access. The need for the Wireless ATM arose due to the sophisti- cation of end-user telecommunications services and applications, the development of portable, multimedia capable end-user platforms and the benefits of the ATM.

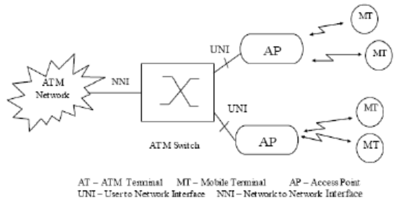

Fig 2: WATM Network Architecture

The WATM concept extends ATM into the wireless environment, by adding mobility and radio aspects
into the ATM transmission. The concept of wireless ATM was explained earlier in [4, 9]. Fig.2 shows the WATM network architecture. It comprises of Mobile Terminals (MT), Access Points (AP) and ATM switches. Some of the distinguishing features of wireless ATM are listed below [7].

- It supports wireless access to telecommunication services with a high multimedia content, including interactive voice, video and packet data.
- It provides at least limited terminal mobility, i.e. the capability of a user to maintain communication through a fixed infrastructure while moving the wireless ATM terminal device between access point.
- It is deployed well integrated into the ATM infrastructure used for fixed communication, such that it will not affect fixed-only communication.
- It is implemented in a way that allows sharing of key network resources, such as transmission links and switches.

3.2 Services of WATM

The B-ISDN vision aims to integrate all communications into one universal system.ATM/B_ISDN network offer flexible platform to the applications by supporting different services classes.The ATM forum has defined a set of traffic classes and their parameters.The traffic classes are called service categories. They are Constant Bit Rate(CBR), Real time Variable Bit Rate (rt-WR), Non real time Variable Bit Rate (nrt-
WR), Available Bit Rate **(ABR) and Unspecified** Bit Rate (UBR). ABR is the **best** effort service where neither data rate nor less delay is guaranteed . However, the minimum and maximum rates are guaranteed which gives bound on the cell loss rate.

This service allows an ATM system to fill its channels to the maximum capacity when CBR or VBR **traffic** is low **f633.** The UBR is equivalent to ABR but without guaranteed minimum rate and bound on the cell loss rate. The typical use for this is **in** non real-time applications such **as** file **transfer, backup** traffic and e-mail. Even in high speed systems like **ATM,** channel capacity is a scarce resource that must be shared between its users. ***An*** ATM switch can be a service arbitrator but it must know the needs of its terminal nodes. ATM terminal **nodes** request services in terrns of destination, Wic type, bit rate and QoS. The request can be granted without **affecting** the services **already** committed. Table.1 summarizes typical targets for WATM service capabilities.

3.3 WATM Protocol Architecture

The WATM protocol architecture is based on integration of radio access and mobility features within the standard ATM protocol stack (Fig. 3, 4). It facilitates for gradual evolution of radio access technologies without modifying the core mobile ATM network specifications [10]. While [2, 8] deals with the architectural design aspects of WATM, [3, 6] highlights the limits, challenges of WATM and the proposals. A WATM system broadly consists of a *Radio Access Layer* and *Mobile ATM* network.

Traffic Class	Application	Bit-rate range	QoS Requirement
CBR	Voice and Digital TV	32 Kbps- 2 Mbps	Isochronous Low Cell Loss Low Delay Jitter
VBR	Video Conferencing Multimedia communication	32 Kbps- 2Mbps (avg) 128 Kbps-6 Mbps (max)	Moderate Cell Loss Low Delay Jitter Statistical Mux.
ABR	Interactive data Client-server	1- 10 Mbps	Low Cell Loss Can tolerate higher delays High burst rate

Table 1: Wireless ATM requirements

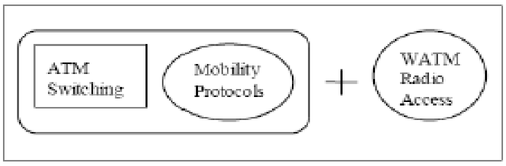

Figure 3: Modular Protocol Architecture of WATM System..

1. Radio Access Layer (RAL) is responsible for the radio link protocols for wireless ATM access. Radio Access Layers consists of PHY (Physical Layer), MAC (Media Access Layer), DLC (Data Link Layer) and RRC (Radio Resource Control). The RAL requirement details are explained in [13].

2. Mobile ATM deals with control/signaling functions needed to support mobility. These include *location management, handover* and *connection control*. Location management is responsible for keeping track of the MT. Handover (or Handoff) refers to the process of rerouting the mobile terminal connections from the old to the new base station. Connection control deals with connection routing and QoS maintenance.

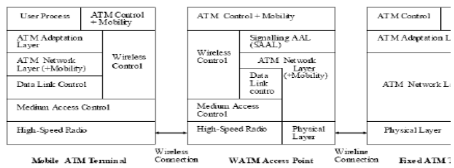

Figure 4: Wireless ATM Protocol Stack Architecture.

3.4 CHARACTERSTICS OF WATM

The Key aspects of WATM and mobility extensions, added to the fixed ATM network are explained as follows [14].

1. *Cellular Architecture*: In WATM, the geographical area is organized into small cells. The cellular organization of space potentially poses problems like increased handoff rates (due to crossings across the cells). The sharing of bandwidth and re-using of frequencies gives rise to the problem of cochannel interference. Lesser the cell size accommodates greater capacity per unit area, but it increases handover rate and in turn dropping rate due to increased crossings across the cells.

2. *Resource Allocation*: QoS provisioning is an important consideration inWATM networks. An explicit resource allocation using a combination of admission, traffic shaping and policing mechanisms is used to achieve it. The connection admission mechanism must take into account possible congestion, also ensure a low rate of dropped connections as users roam among different wireless coverage areas. The admission control is based on several criteria such as: traffic and handover characteristics, call holding time statistics, desired QoS of each class of traffic and amount of radio resource available.

3. *Mobility Management*: Mobility management [15] deals with issues such as handover signaling, location management, and connection control. *Location management* is responsible for locating the mobile node. It involves two-stage process: *Location Registration* and *Call Delivery*. In the first stage, the MT periodically notifies the network of its current location and allows the network to update its location profile. The second stage involves querying the network for the user location profile in order to route incoming calls to the current location of MT. Two basic location management schemes have been proposed in the *Mobile PNNI scheme* and the *Location register scheme*. The *Handoff Management* [14] is responsible for rerouting the mobile terminal connections from the old to the new base station. *Connection control* deals with connection routing and QoS maintenance.

4 HANDOFF IN WIRELESS ATM NETWORKS

4.1 HANDOFF MANAGEMENT OPERATION

The Handoff management enables a Mobile Terminal (MT) to move seamlessly from one access point (AP) to another, while maintaining the negotiated Quality of Service (QoS) of its active connections. Handoff Management involves three-stage process as in Fig.5. [16]:

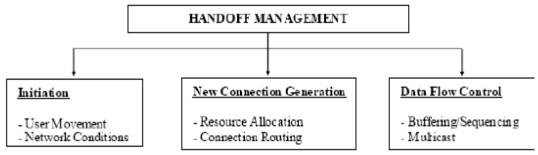

Fig 5: Handoff Management Operations.

1. Initiation: It involves handoff decision making, wherein the need for handoff is identified by either MT or network agent. Various handoff initiation criteria, kinds of handoff decision are discussed in describes the optimum selection of handoff initiation algorithm and related parameters.

2. New Connection generation: It involves the generation of new connections which comprises of finding new resources and performing additional routing operations.

3. Data flow control: It involves data delivery along new established path with the agreed QoS guarantees.

4.2 HANDOFF TYPES

Wireless ATM supports the following handoff types. The handoff type used in a system depends on the radio interface technology used . *Backward Handoff* : In backward handoff, the handoff is predicted in advance using radio hint and the execution of handover is initiated via current access point.

2. *Forward handoff* : In forward handoff, a MT moves abruptly to new access point and handover is initiated after the mobile is associated with new access point.

3. *Hard Handoff* : In hard handoff, MT communicates with only one access point at any time. They are characterized by *break before make*. The current resources are released before new resources are used.

4. *Soft Handoff* : In soft handoff, a mobile can communicate with more than one access points during handoff. They are characterized by *make before break*. Both current and new resources are used during handover.

4.3 HANDOFF REQUIREMENTS

The requirements for the handoff procedure are listed in ATM Forum/96-989 . *Handoff Latency*: The delays and delay variations during handoffs should be minimized to guarantee the QoS of WATM connections.

2. *Scalability*: The handoff procedure should support seamless handoff between APs in different private and/or public networks.

3. *Quality of Service (QoS)*: QoS guarantees negotiated with connections should be preserved during handover. The important traffic parameters to be considered are Cell Loss Ratio (CLR) and Cell Delay Variation (CDV).

4. *Signalling Traffic*: Handoff signaling traffic should be kept to a minimum in order to reduce the load on the wired network and the air interface to the MT.

5. *Resource consumption efficiency*: Handoff procedure should aim at low buffer consumption to reduce latency and minimize the consumption of bandwidth.

6. *Data Integrity* : It includes minimization of cell loss, avoiding of cell duplication and maintaining cell-sequence for each connections.

7. *Group Handover*: The efficient handoff of multiple active VCs should be supported by the Handoff procedure.

8. *Registration and Authentication*: The handoff of the MT should not compromise the established security between the MT and network.

4.4 HANDOFF PROTOCOLS

The Proposed handoff protocols can be classified into four categories [16]:

1. *Full Connection Re-routing*: It involves the establishment of a new VC as if it is a new call. An

Inter-Working Devices Handoff scheme proposed in makes use of external processors called

Inter-Working Devices (IWDs) to manage handoff. These techniques are optimal, but latent due to the need of computation of new routes.

2. *Route Augmentation*: It involves route extension by adding a route from last position to current position of MT. It offers a simplest means of achieving handoff, since it requires no cell sequencing, little buffering and not much additional routing. It does not provide optimal path.

3. *Partial Connection Re-routing (Incremental Re-establishment)*: In this technique, a part of route is

preserved for simplicity, while the rest is re-routed for optimality. The Nearest Common Node Rerouting (NCNR) algorithm presented in routes the connection according to the residing zone of MT. The NCNR attempts to perform the rerouting for a handoff at the closest ATM network node that is common to both zones involved in the handoff transaction. The Hybrid Connection algorithm presented in consists of Cross-Over Switch (COS) discovery. In case of intra-cluster handoff, the cluster switch itself performs the handoff at COS. In inter-cluster handoff, the COS discovery process is initiated, based on the handoff hint message provided by the MT. A partial path is setup between the COS and target switch, while the rest of the old path is preserved. This technique provides better resource utilization and reduced signaling, but requires computation of nearest node or COS, buffering and cell sequencing.

4. *Multicast Connection Rerouting*: This method combines the above three techniques. It pre-allocates resources in the network portion surrounding the macro-cell where the mobile user is located. When a new mobile connection is established, a *virtual connection tree (VCT)* is created, connecting all Base Stations (BSs) including the macro-cells towards which the MT might move in the future. Thus, the mobile user can freely roam in the area covered by the tree without invoking the network call acceptance capabilities during handover. The allocation of the VCT may be static or dynamic during the connection tenure. This approach is fast and can guarantees the negotiated QoS in case of network handover, but it may not be efficient in terms of network bandwidth utilization, since there exists the possible denial of a connection due to lack of resources and high signaling overheads, especially in the case of dynamic tree allocation. A summary of comparison of handoff management approaches is listed in table 2 [16]. The detailed analysis can be found in

	Full	Extension	Partial	Multicast
Merits	-Optimal Route -Existing Methodol-ogy	-Fast -Maintains cell se-quence	-Maintains cell se-quence -Reduced resource utilizations	-Fast -Maintains cell se-quence
Demerits	-slow -Inefficient Resource Reassignments	-Wastes Bandwidth -Inefficient routing of connections	-Complex -Needs added switch-ing	-Needs extra Buffer -Bandwidth Pre-allocation

Table 2: Comparison of handoff management approaches.

4.5 LITERATURE SURVEY

WATM networks are motivated by the increasing importance of portable computing and telecommunication applications in both business **and** consumer markets. RaychaudhUn:.D explained the concepts of WATM and the technological rationale for WATM. The paper by Ayanagu1u.E et **a1** [8] described the concept, implementation issues **and** challenges for WATM networks.

The proper design of LLC and MAC layer protocols of a WATM network improves its overall quality. **A** few important studies of **LLC** techniques have been **made** for wireless ATM networks. **Walke.B,** Petrrts.D and P1assmann.D proposed **wireless** ATM air interface and network protocols of the mobile broadband system. This paper presented the structure of the LLC layer **and** its cooperation with the MAC **layer.** Cain.J.B and McGregor.D.N proposed an error control architecture for wireless **ATM** network **with wireIw** links, In this paper, an error control architecture is recommended which includes the application of **FEC,** interleaving **and** data **link ARQ.**

Petr3s.D et al **1811** presented the performance evolution of logic link contml protocol for an **ATh4** air interface. Raychaudhuri.D and Wi1son.N.D **[9]** proposed **ATM** based transport architecture for multimedia wireless personal communication networks. **Nakayama-Y** and **Aikawa-S** authored Cell discard and **TDMA**

synchronization using FEC in wireIess ATM systems. This paper discussed the bit error rate, cell
discarding and FEC issues. Chen Cheng.F **and** Ho1tman.J.M **El23** proposed Wireless intelligent ATM network and protocol design for fiture personal communication systems. Bernard **Sklar** explained the characteristics of Rayleigh fading channels in mobile communication. Lu.D.L **and** Chang.J.F] analysed the performance of ARQ protocols in non independent channel. Fujiwara.T and Kasarni.T proposed error detecting shortened Hamming codes. Vinod **K.Agarwa1** and Andre Ivanov computed the probability of undetected error for shortened cyclic codes. Kikumoto.Y and Leung.C.H.C **1861** presented **the** throughput efficiency of the Go-Back-N **ARQ** scheme under Markov and related error schemes. In this paper, a new approach for the Go-Back-N ***ARQ*** scheme, where 'N' denotes the block size used in the communication, applicable to Markov error pattern was proposed. Go-Back-N ***ARQ*** protocol is usually employed for satellite communications which have long round-trip time. Kenichi Mase [87] proposed **Go-** Back-N ARQ schemes for point-to-multipoint satellite communication. **This** paper proposed a modified conventional **Go-Back-N ARQ** scheme so as to be applicable for point-to-multipoint communication.

Hang Liu **gave** the detailed analysis of different emr control schemes. In this paper, they gave **an** alternative error control scheme available for providing reliable end-to-end communication in wireless environments. Performance analysis of different forward error correction **schemes** are discussed in Digital Communications by John ***G.*** Proakis Error **Control Coding:** Fundamentals **and** Applications by **Shu** Lin **and Jr.** Daniel **J,** Costello and Fundamentals of Error-Correcting Codes by **Cary Huffman.** W and Vera Pless [go]. Interleaving is done to randomize **bursty** errors**].** Dealing with wireless links, characterized by limited bandwidth and **high** bursty error rates, breaks the main assumption of conventional ATM systems. Therefore, WATM systems must provide a transparent mechanism to ensure reliable end-to-end data transmission over the wireless portion of the network. It is identified that a wireless specific data link control **(W-DLC)** layer, sitting between the traditional ATM layer **and** a wireless-specific medium access control (W-MAC) layer, is the responsible entity for guaranteeing the **QoS** requested by individual ATM-based virtual connections. Code combining is an efficient error control technique than conventional schemes. Chase.D **1393** authored Code combining - a maximum likelihood decoding approach for combining an arbitrary number of noisy packets. In this paper, Code combining is proposed for error he communication. Code combining was done in the receiver's side to obtain a packet with code rate which is low enough for reliable communication to be possible even for channels with extremely high error rate. If channel errors are more, then the Code combining may not cater to the requirements of a wireless channel and a better error control technique is needed. Ding.Q.L and Lin.He proposed a powefil error control technique called Early-Stop **ARQ** for WATM network. This paper discussed about the throughput analysis of the Early-Stop ARQ scheme in the AWGN channel environment. Early-Stop **ARQ** works well in all environments and pefiorms better than the other schemes. But high bandwidth requirement of Early-Stop ***ARQ*** scheme may be its limitation. **RCPC** codes are very much suitable for error control in wireless environments because of their low bandwidth requirements **[9 f** 1. RCPC codes have many advantages.

They are flexible, provide Unequal Error Protection (UEP) **and** adaptive FEC for the wireless ATM cell**.** Ian **F.Akylidz** et a1 analysed CLR performance **and** throughput for **an** adaptive ***HARQ*** based on **RCPC** codes. Employing RCPC codes in Turbo codes will substantially improve the performance of a WATM system. Turbo codes can provide significant **coding** gain by utilizing two constituent convolution codes and an interleaver. Turbo code achieves near Shannon-limit error correcting capability in a Rayleigh fading channel]. The Turbo code encoder is built using a parallel concatenation of **two** recursive systematic convolutional codes and the associated **decoder**. **Turbo** decoding assumes that the decoder has access to iininitely soft (unquantized) channel data **In** practice, a quantizer is used at the receiver md the **turbo** decuder must operate on finite **precision** quantized data. The literature reveals that the use of Nonsystematic Turbo codes Irregular Turbo **codes and** Asymmetric Turbo codes will **further** improve the error performance of a wireless system. Enhancing power control to reduce the number of retransmissions required and call admission control to minimize the end to end CTD are important at the MAC layer to improve the overall quality of the WATM system [log-1 111. Sanchez, proposed power **priorities** based **QoS** guarantees. This paper discusses retransmission algorithm based on power priorities for wireless networks by satiswng **QoS. Acampora.A.S** and P4aghshineh.M [112] proposed a CAC based on Virtual Connection Tree (VCT) algorithm. A mobile user can freely handoff to any cell withinthe VCT without being subject to new admission control. Admission control **for** homogeneous services is considered. Mohamed Naghshineth et al described **a DCAC** scheme. The scheme considered not only the status of the local cell but also the **adjacent** cells. **The total** required bandwidth for both handoff and existing connections is calculated under the assumptions of exponentially distributed channel holding time **and**
perfect knowledge of the rate of handoff. OliveriaC presented a CAC **scheme,** inwhich the **required resources** for a call in its

current cell and in all the **neighbouring** cells are adaptively allocated. Levine.D.A considered a shadow cluster scheme. This scheme estimated future resource requirements in a collection of cells where the mobile unit is likely to visit in **the** future. Admission control is performed based in this estimate. However, this proposal lacks ***ix*** mechanism to determine the shadow cluster in real networks.

Fei Yu and Victor Leung f **proposed** CAC and bandwidth reservation schemes in wireless cellular networks. Their proposal is to statistically predict user mobility based on the mobile history of users. A method of aggregating connection parameters into 'super connection' statistics **and** applying this to a **CAC** algorithm was developed **and** proved by Srinivaan.V et al**.** This method reduces ttaf'fic overhead in an ATM network **and** enables the design of a simple Earliest Deadline First (EDF) switch.4.6 Handoff Management Issues Handoff management has posed several challenges in the implementation of wireless technologies. The open issues are listed below.

1. QoS: The main issue to be considered is guaranteeing of negotiated QoS. The critical factors influencing QoS disruption during handoff are - handover blocking due to limited resources, cell losses, out-of-order cell delivery, delay and delay variations. Minimization of QoS disruption can cost buffering. The QoS provisioning also needs to address the timing and synchronization issues. 2. Rerouting Connections: The issues remain in development of algorithms for finding new route options, creation of signalling protocols for reconfiguring the connection path and determination of the feasibility of proposed solutions.

3. Point to Multipoint: Development of protocols that address rerouting the point-to-multipoint connections
of MTs.

4. Mobile-to-Mobile Handoff: Need to address upgradation of existing protocols in order to support
connection routing and QoS for a mobile-to-mobile
connection.

5. Optimization: Development of efficient methods that allow an existing MT connection to be periodically rerouted along the optimal path.

5 Conclusion

Wireless ATM provides wireless extension to ATM based ISDN networks. This paper reviews the important aspects of wireless ATM and the handoff related issues. It reviews the basic concepts and benefits of ATM.Then the important features of WATM service models,protocol model, the key characterstics of WATM and the global activities on WATM are dealt.The paper focuses on the survey of handoff techniques in WATM and related issues. The handoff requirements,various strategies and open issues are discussed.

References

[1] R. Handel, M. N. Huber, S. Schroder: ATM Networks-concepts, protocols and applications 7e. *Pearson Education Ltd*; India (2004)

[2] D. Raychaudhuri: Wireless ATM Networks-Architecture, System Design and Prototyping. *IEEE Personal Communications*. 3 (4), 42-49 (1996)

[3] B. Kraimeche: Wireless ATM- Current Standards and Issues. *IEEE Wireless Communications and Networking Conference*. 1, 56-60 (1999)

[4] D.Raychaudhuri, N. D. Wilson: ATM-Based Transport Architecture for Multi services Wireless Personal Communication Networks. *IEEE Journal On Selected Areas in Communications*. 12 (8), 1401- 1414 (1992)

[5] T. Nadeem, R. Miller: Survey on Wireless and Mobile ATM Networks. *Wireless and ATM Networks*. (2002)

[6] E. Ayanoglu, K.Y. Eng, M. J. Karol: Wireless ATM- Limits, Challenges and Proposals. *IEEE Personal Communications*. 3 (4), 18-34 (1996)

[7] Hakan Mitts: Architectures for wireless ATM. *Helsinki University of Technology*. (June 1996).
http://lib.tkk.fi/HUTpubl/publications/mitts96.html.

[9] D. Raychaudhuri, N. Wilson: Multimedia Personal Communication Networks- System Design Issues. *Proc. 3rd WIWLAB Workshop on 3rd Generation Wireless Information Networks*. 259-288 (1992)

[10] Ayse Yasemin Seydim: Wireless ATM (WATM) An Overview. *Southern Methodist University, EE 8304 Spring 2000, Section 799*. (2000)http://www.engr.smu.edu/˜yasemin/watm.pdf.

[11] R. R. Bhat and K. Rauhala: Draft Baseline Text forWireless ATM Capability Set 1 Specification. *BTD WATM-01, ATM Forum*. (Dec. 1998)

[12] L. Dellaverson: Reaching the New Frontier. *The ATM Forum Newsletter*. 4 (3), (Oct.1996). http://www.atmforum.org/atmforum/library/53bytes/backissues/v4-3/article-08.html

[13] Damian Gilmurray, Alan Jones, Oliver Mason, John Naylon, John Porter: Wireless ATM Radio Access Layer Requirements. *ATM Forum/96-1057/WATM*. (Aug. 1996)

[14] C. Chrysostomou1, A. Pitsillides, F. Pavlidou: A Survey of Wireless ATM Handover Issues. *Proc. of the Int. Symposium of 3G Infrastructure and Services*. 2 (3), 34-39 (2001)

[15] A. T. Campbell, K. Rauhala: Mobile ATM- State of the Art and Beyond. *IEEE Networks*. 12 (1), 10-11 (1998)

[16] I. Akhyldiz: Mobility Management in Next generation Wireless System. *Proceedings of the IEEE*. 87 (8), 1347-1384 (1999)

[17] Upkar Varshney: Supporting Mobility with Wireless ATM. *IEEE Computers Magazine*. 30(1), 131- 133 (1997)

[18] A. Kaloxylos, G. Dravopoulos, H. Hansen: Mobility Management Extensions in the Wireless ATM Network Demonstrator. *Proceedings of the ACTS-98 Summit, Rhodes, Greece*. (1998)

[19] A. Kaloxylos, G. Alexiou, S. Hadjiefthymiades, L. Merakos : Design and Performance Evaluation of a Mobility Management Protocol forWireless ATM Networks. *Proceedings of PIMRC-98, Boston USA*. (1998)

[20] Alex Kaloxylos, S. Hadjiefthymiades, and Lazciros Merakos: Mobility management and control protocol for Wireless ATM Networks, *IEEE Networks*, 19-27 (Jul./Aug.-1998)

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