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A Review On Network Algorithms, Protocols And Architectures

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Abstract:

This article is a literature review on network algorithms, protocols and architectures. This study is based on the reports researchers, who published their results between 2005 and 2015. Many researchers have focused their efforts designing and developing many ways to communicate the network devices. This paper introduces the reader to the network algorithms, protocols and architecture that are used for data transfer between devices. Authors studied the different protocols like carrier sense multiple access (CSME), real-time flood routing voice (RTFRV), Hybrid random Access and Reservation protocol (HARP), reservation arbitrated (RA) protocol,centralized packet filtering (CPF) protocol, media access control (MAC) protocol etc. ALOPEX-based approach takes advantage of the favorable control characteristics of the algorithm such as high adaptability and high speed collective computing power for effective buffer utilization and uses complete sharing buffer allocation strategy and enhances its performance for high traffic loads by regulating the buffer allocation process dynamically.

Keywords: Network Algorithms, Protocols and Architectures.

Introduction:

The term algorithm is used to describe a wide variety of procedures or formulas to solve a problem.In computing, an algorithm is a sequence of unambiguous instructions for solving a problem. It allows achieving a desired result for any legitimate input in a finite amount of time. All network devices must execute an algorithm in order to know how to act to communicate with other network devices. A network Algorithm consists of a finite list of instructions (which are well defined) that can be used by the network device to perform the communication.

A network protocol is a standard procedure and format that two data communication devices must understand, accept and must strictly use to be able to talk to each other.Protocols may be implemented by hardware, firmware, and software or by a combination of them. Protocols perform different functions according to their purpose. Network architecture, is the logical and structural layout of the network consisting of transmission equipment, software and communication protocols and infrastructure (wired or wireless) transmission of data and connectivity between components.

1) NETWORK ALGORITHMS.

Researchers and scientists had developed different network algorithms. A brief review of these methods has been presented here.

Michael Q. Rieck et al (2005) [1]described a distributed algorithm (generalized *d*-CDS) for producing a variety of *d*-dominating sets of nodes that can be used to form the backbone of an ad hoc wireless network. MertAkdere et al (2006) [2]showed the applicability of epidemic algorithms in the context of wireless sensor environments, and provide a comparative performance analysis of the three variants of epidemic algorithms in terms of message delivery rate, average message latency, and messaging overhead on the network. Nicolaos B. Karayiannisand S.M. NagabhushanKaliyur (2006) [3]introduced an entropy-constrained algorithm for routing of communication networks. Ahmed Abbasiand Mohamed Younis (2007) [4]surveyed different clustering algorithms for wireless sensor networks (WSNs); highlighting their objectives, features, complexity, etc and also compared of these clustering algorithms based on metrics such as convergence rate, cluster stability, cluster overlapping, location-awareness and support for node mobility. SofieneJelassi and HabibYoussef(2008) [5] described the design of a playout algorithm tailored for real-time, packet-based voice conversations delivered over multi-hop wireless ad-hoc networks.

Lei Guoet al (2008) [6] addressed the problem of shared sub-path protection with considering the constraint of traffic recovery time and proposed a new heuristic algorithm called Traffic recovery time Constrained Shared Sub-Path Protection (TC_SSPP) to compute the working path and the Shared-Risk-Link-Group (SRLG)-disjoint backup sub-paths. The main target of this work was to improve the resource utilization ratio and reduce the blocking probability for dynamic networkenvironment. By properly setting the delay parameter for each link and running the Delay Constrained Shortest Path Algorithm (DCSPA) to compute the backup sub-paths, TC_SSPP can effectively guarantee the traffic recovery time. Simulation results showed that the proposed TC_SSPP can outperform the traditional algorithms.An energy-efficient multi-level clustering algorithm called EEMC, which was designed to achieve minimum energy consumption in sensor networks was proposed by Yan Jin et al (2008) [7].

Several multi-sender algorithms are proposed to reliably deliver a media stream to the receiver through the intrinsically unreliable peer-to-peer(P2P) networks by Mohammad HamedFirooz et al (2009) [8].A routing algorithm termed Energy-

efficient Routing Algorithm to Prolong Lifetime (ERAPL) was proposed by Yi-hua Zhu et al (2010) [9], which is able to dramatically prolong network lifetime while efficiently expends energy.

LannySitanayah et al (2010) [10]proposed a heuristic algorithm to find the boundary nodes which are connected in a boundary cycle of a location-free, low density (average degree 5–6), randomly deployed WSN and developed the key ideas of our boundary detection algorithm in the centralized scenario and extend these ideas to the distributed scenario. PatrikMoravek et al (2011)[11] was focused on the sophisticated Vivaldi algorithm and its variations. A special simulation tool was developed in order to simulate the influence of configuration parameters and setting to algorithm performance. Several tests were performed to examine how both convergence and accuracy of localization process are affected by different settings of algorithm constants and by the number of reference points.P. Mérindol, P. Francois, O. Bonaventure, S. Cateloin, J.-J. Pansiot et al(2012) [12] was presented an efficient algorithm that allows routers to enable more path diversity andthey achieves a good tradeoff between path diversity and overhead.EimanAlotaibi, Biswanath Mukherjee et al(2012) [13] presenteda survey of the routing algorithms proposed for wireless networks. A number of routing algorithms have been proposed as extensions to these basic routing algorithms to enhance their performance in wireless networks.JiongJina, MarimuthuPalaniswamia, BhaskarKrishnamachariet al (2012) [14] addresses the rate control and resource allocation problem for heterogeneous wireless sensor networks, which consist of diverse node types or modalities such as sensors and actuators, and different tasks or applicationsand they also developeda utility framework of rate control for heterogeneous wireless sensor networks with single- and multiple-path routing, and propose utility fair rate control algorithms, that are able to allocate the resources efficiently and guarantee the application performance in a utility proportional or max–min fair manner. Furthermore, the optimization and convergence of the algorithm is investigated rigorously as well.JavadAkbariTorkestani et al (2012) [15] strong theorem is presented to show the convergence of the proposed algorithm.

IbrahimaDiarrassouba, Ali Lourimi, Ali RidhaMahjoub, Habib Youssef et al (2013) [16] proposed an exact and efficient Branch-and-Cut algorithm for the problem in the context of a hose workload model. In particular, they consider the case when the ingress and egress traffic at VPN endpoints are asymmetric and the links of the network have unbounded capacities. Using this and a deep investigation of the polyhedral structure of that formulation, our algorithm permits to solve large instances of the problem having up to 120 nodes and 10 terminals.Chathura M. SarathchandraMagurawalage, Kun Yang, Liang Hu, Jianming Zhang et al (2014) [17]proposed a new system architecture for mobile cloud computing (MCC) that includes a middle layer sitting between mobile devices and their cloud infrastructure or clones.They also introduce a data caching mechanism at cloudlets to further improve the overall MCC performance. Simulation results demonstrate the effectiveness and efficiency of the proposed system architecture and offloading algorithm in terms of response time and energy consumption. Dina S.M. Hassan, Hossam M.A. Fahmy, Ayman M. Bahaa-ElDinet al (2014) [18]considers the development of a new distributed connected-dominated-set clustering algorithm

called Ring Clustering Algorithm. This allowed RCA to achieve the lowest fixed approximation ratio (5.146). Moreover, RCA has O(n) for both time and message complexities. Thus, RCA algorithm outperforms the current-best CDS algorithms that are investigated in this paper.RóżaGoścień, Krzysztof Walkowiak, MirosławKlinkowski et al (2015) [19] presented a novel method based on the standard tabu search (TS) approach, dedicated to solve the routing, modulation and spectrum allocation (RMSA) problem in elastic optical networks (EONs). Noor Al-Nakhala, ,Ryan Riley , TarekElfouly (2015) [20] proposed the binary consensus algorithm for use in wireless sensor networks. Binary consensus is used to allow a collection of distributed entities to reach consensus regarding the answer to a binary question and the final decision is based on the majority opinion. Binary consensus can play a basic role in increasing the accuracy of detecting event occurrence. The implementation is asynchronous and based on random communication. In this work, they expand the previous implementation to test it on 139 hardware testbed. They minimize the convergence time achieving ultimate results. Our implementation show successful results and all the motes are able to converge to the expected value in very short time.

2) NETWORK PROTOCOLS.

Researchers and scientists had developed different network protocols. A brief review of these protocols has been presented here.

Steven Chamberland (2005) [21] proposed a model for the point of presence (POP) design problem in Internet protocol (IP) network with performance guarantees, where a POP is a node composed of several interconnected co-located backbone routers within a central office. Ping Wang et al (2006) [22] proposed a hierarchical multicast protocol in Mobile IPv6 networks (HMoM), which utilizes the advantages of hierarchical mobility management in handling unicast routing.

Yue-yang LIU et al (2006) [23] presented a new routing protocol with optimal data aggregation. This routing protocol has good performance due-to its optimal selection of aggregation point locations. Alejandro Quintero et al (2007) [24] proposed a novel Location-Enhanced On-Demand (LEOD) routing protocol which is based on smart antenna technique. The LEOD protocol utilizes local position instead of global position to discover routes and make routing decision for the ad hoc network. Theoretical computation and simulation results show that data packet loss rate decreased significantly compared to other methods well-documented in the literature. In addition, this protocol reduces the network control overheads and the power consumption. It also improves network average throughput

Zhiguo Wan et al (2007) [25]proposed a password-based protocol and a public key cryptosystems (PKC)-based protocol for the Lancaster architecture and the Stanford architecture, respectively. These protocols provide mutual authentication, perfect forward secrecy and access control for wireless networks. Moreover, they also provide DoS resistance and identity confidentiality for the client. Also authors presented detailed security and performance analysis for their protocols, and showed that both of their protocolsare secure and efficient for access control in wireless

networks. Tz-Heng Hsuand Jyun-Sian Wu (2008) [26] proposed an application-specific duty cycle adjustment MAC protocol (i) to conserve energy on sensors with low data traffic and (ii) to decrease transmission latency on sensors with heavy data traffic. In the proposed scheme, nodes are not required to follow a single generic duty cycle. Each node can have different listen and sleep schedules with different duty cycles.

An innovative encryption-free reputation sharing protocol has been proposed for Gnutella-like peer-to-peer network by Xin-Xin Maand Zhi-Guang Qin (2008) [27].

Jaesub Kimand Kyu Ho Park (2009) [28] suggested a transport-controlled MAC protocol (TC-MAC) that combines the transport protocol into the MAC protocol with the aims of achieving high performance as well as energy efficiency in multi-hop forwarding. Although TC-MAC also works through a periodic listen-and-sleep scheme, it lowers end-to-end latency by reserving data forwarding schedules across multi-hop nodes during the listen period and by forwarding data during the sleep period, all while increasing throughput by piggybacking the subsequent data forwarding schedule on current data transmissions and forwarding data consecutively. In addition, TC-MAC gives a fairness-aware lightweight transport control mechanism based on benefits of using the MAC-layer information. The results showed that TC-MAC performs as well as an 802.11-like MAC in end-to-end latency and throughput, and is more efficient than S-MAC in energy consumption, with the additional advantage of supporting fairness-aware congestion control.

Neng-Chung Wangand Chao-Yang Lee (2009) [29] proposed a reliable multi-path QoS routing (RMQR) protocol with a slot assignment scheme. In this scheme, authors examined the QoS routing problem associated with searching for a reliable multi-path (or uni-path) QoS route from a source node to a destination node in a MANET.An Infrastructure based Data Gathering protocol (IDGP) and a Distributed Data Gathering protocol (DDGP) are proposed to plan the data gathering path for a mobile sink by Jang-Ping Sheu et al (2010) [30].

M. AykutYigitel, ,OzlemDurmazIncel , CemErsoy (2011)[31] discussed about the Quality of Service QoS-provisioning in sensor networks and evaluate the efficiency of existing QoS-aware MAC protocols. As a result of this evaluation, they design and implement a QoS-aware MAC protocol for WMSNs, Diff-MAC. Diff-MAC aims to increase the utilization of the channel with effective service differentiation mechanisms while providing fair and fast delivery of the data. Performance evaluation results of Diff-MAC, obtained through extensive simulations, show significant improvements, in terms of latency, data delivery and energy efficiency, compared to two other existing protocols. Muhammad AzharIqbala, Bin Daia, , , BenxiongHuanga, A. Hassana, ShuiYub et al (2011) [32]they provide a comparison of available (network coding) NC-aware routing schemes and conclude that NC-aware routing techniques have several advantages over traditional routing in terms of high throughput, high reliability, and lower delay in a wireless scenario. To the best of their knowledge, this work is the first that provides comprehensive discussion about NC-aware routing protocols.Chirag K. Rupani, ,Trilok C. Aseri et al (2011) [33] analyzed pump slowly, fetch quickly (PSFQ) protocol and presented an

improved transport layer protocol for wireless sensor networks. The improved protocol has been analyzed based on various factors such as average latency and average error tolerance and it is found that the proposed protocol is better than PSFQ in terms of these factors.FaranakHeidariana, 1, ,JulienSchmaltza, b, Frits Vaandragera, C. Aseriet al (2012) [34] proposed clock synchronization protocol for the Chess platform. The results have been checked using the proof assistant Isabelle. They report on the exhaustive analysis of the protocol for networks with four nodes, and we present a negative result for the special case of line topologies: for any instantiation of the parameters, the protocol will eventually fail if the network grows.NicoSaputro, Kemal Akkaya, SuleymanUludaget al (2012) [35] they provide a comprehensive survey of the existing routing research and analyze the advantages and disadvantages of the proposed protocols with respect different applications areas. They also identify the future research issues that are yet to be addressed with respect to the applications and network components. This survey is to identify routing design issues for the SG (Smart Grid) and categorize the proposed routing protocols from the SG applications perspective. This work will be valuable for the utilities and other energy companies whose target is to develop and deploy a specific SG application that may span different network components. In addition, this they provide valuable insights for the newcomers who would like to pursue routing related research in the SG domain.SudhanshuTyagia, ,NeerajKumarbet al (2013) [36] found in literature that clustering is the most common technique used for energy aware routing in WSNs. The most popular protocol for clustering in WSNs is Low Energy Adaptive Clustering Hierarchy (LEACH) which is based on adaptive clustering technique. They found the taxonomy of various clustering and routing techniques in WSNs based upon metrics such as power management, energy management, network lifetime, optimal cluster head selection, multihop data transmission etc. B. Bellalta, A. Faridi, D. Staehle, J. Barcelo, A. Vinel, M. Oliver et al (2013) [37] we study the benefits of such Multiple Packet Transmission (MPT) approach, when it is used in combination with a Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) protocol.To this end, a very simple Media Access Control (MAC) protocol that captures the fundamental properties and tradeoffs of a CSMA/CA channel access protocol supporting MPT is introduced. Using this protocol as a reference, a new analytical model is presented for the case of non-saturated traffic sources with finite buffer space. Simulation results show that the analytical model is able to accurately characterize the steady-state behavior of the reference protocol for different number of antennas and different traffic loads, providing a useful tool for understanding the performance gains achieved by MAC protocols supporting MPT.Ying Li, , RadimBartos et al (2014) [38] summarizes characteristics of Intermittently Connected Delay-Tolerant Wireless Sensor Networks (ICDT-WSN) and their communication protocol requirements, and examines the communication protocols designed for Wireless Sensor Networks (WSN) and Delay-Tolerant Networks (DTN) in recent years from the perspective of ICDT-WSNs. Opportunities for future research in ICDT-WSNs are also outlined.RatnadipAdhikari et al (2014) [39] discussed about the associated issues and difficulties which are faced in designing efficient MAC protocols for Wireless Sensor Networks (WSN). Several popularMedium Access Control (MAC) protocols are

described here with their inherent merits and demerits. In order to provide an up-to-date survey, various MAC protocols which have been developed relatively recently are discussed, together with the traditional benchmark ones. Finally he concludes with outlining a number of innovative ideas and future research directions in this domain.Muhammad AdeelMahmood, Winston K.G. Seah, Ian Welch et al (2015) [40]presented a survey on reliability protocols in WSNs. They reviewed several reliability schemes based on retransmission and redundancy techniques using different combinations of packet or event reliability in terms of recovering the lost data using hop-by-hop or end-to-end mechanisms. They also analyzed these schemes by investigating the most suitable combination of these techniques, methods and required reliability level in order to provide energy efficient reliability mechanism for resource constrained WSNs. The 3D reference model for classifying research in WSN reliability, which will be used to perform in-depth analysis of the unexplored areas.Sangyup Hana, ,MyungchulKima, Ben Leeb, , Sungwon Kanga et al (2015) [41] proposednew handoff scheme using the geomagnetic sensor embedded in mobile devices in order to reduce the handoff delay and packet loss problem. The evaluation results demonstrate that the proposed schemes maintain seamless quality for real-time video even in an environment with frequent handoffs. They also noted that the proposed schemes are a client-only solution and do not require modification of the existing Access point (AP)s, which renders themvery practical.

3) NETWORK ARCHITECTURE.

Researchers and scientists had developed different network architectures. A brief review of these architectures has been presented here.

Ben C.B Chan et al (2005) [42] presented the design and implementation of a programmable and extensible router architecture. The proposed architecture not only provides the conventional packet forward/routing functions, but also the flexibility to integrate additional services (or extension) into a router.G. Xilouris et al (2005) [43] proposed a prototype mesh topology network architecture based on regenerative DVB GEO satellites, which enables the interconnection of heterogeneous terrestrial distribution nodes to each other, with minimum possible delay and offering maximum spectral efficiency of the satellite transponder.

SumitGhosh (2006) [44] introduced a radically new approach, termed Predictive Dynamic Output Buffer Reconfiguration (PDOBR) architecture, wherein the output buffer organization in the switch fabric was reconfigured dynamically, i.e., during network operation, under the call processor's control, such that the network incurs minimal cell drop stemming from buffer overflow.

Yu Cheng et al (2006) [45]presented the Autonomic Service architecture (ASA), a uniform framework for automated management of both Internet services and their underlying network resources. ASA ensures the delivery of services according to specific service level agreements (SLAs) between customers and service providers.A. Lazzez et al (2007) [46] proposed a node architecture suitable for optical packet and burst switching that allows a prioritized buffering mechanism for contention resolution and QoSsupport.Middleware architecture, based on open and technology-

independent Application Programming Interfaces, which could constitute the potential foundation for fruitful networks homogenization and openness in service level, was described and analyzed by Nikolaos Tselikas et al (2007) [47].

A new scheme for end to end reliable file/resource sharing was studied by Constandinos X. Mavromoustakisand Helen D. Karatzaet al (2008) [48] among mobile peer-to-peer users. The proposed scheme uses the Hybrid Mobile Infostation System (HyMIS) architecture to maintain and enhance the reliability of file/resource sharing process among wireless devices.

K. Christodoulopoulos et al (2009) [49]compared the centralized and distributed meta-scheduling architectures for computation and communication tasks in Grid networks. Fabio Martignon et al (2009) [50] proposed MobiSEC, a complete security architecture that provides both access control for mesh users and routers as well as a key distribution scheme that supports layer-2 encryption to ensure security and data confidentiality of all communications that occur in the Wireless mesh networks.

Multi-rate adaptation architectures was proposed by Ahmed Yahya (2010) [51] to reduce the control overhead and to increase bandwidth utilization efficiency.Subharthi Paul, Jianli Pan, Raj Jain et al (2010) [52] presented a comprehensive survey of research projects and activities. The topics covered include various testbeds for experimentations for new architectures, new security mechanisms, content delivery mechanisms, management and control frameworks, service architectures, and routing mechanisms. Delay/disruption tolerant networks which allow communications even when complete end-to-end path is not available are also discussed.Ivan Vidal, Antonio de la Oliva, Jaime Garcia-Reinoso, Ignacio Soto et al (2011) [53] presented TRIM, an architecture for transparent IMS-based mobility. TRIM supports mobility in IMS networks transparently to the end-user applications, which are unaware of the handover management procedures executed between the mobile node and the network. They performed several experiments with a TRIM prototype, using a real IMS testbed with 3G and WLAN access networks, validating the proposal for UDP and TCP based applications.Chih-Lin Hu, Chien-An Cho et al (2011) [54] presented a mobile content sharing scenario in which a networked device can discover neighboring devices and share multimedia content in a convenient, networked manner. Dino Martin Lopez Pachecoa, Tuan Tran Thaic, Emmanuel Lochinb, FabriceArnald et al (2012) [55] proposed an architecture based on a hybrid E2E-ERN approach allowing ERN protocols to be inter-operable with current IP-based networks. Without introducing complex operations, the resulting E2E-ERN protocol provides inter and intra protocol fairness and benefits from all ERN advantages when possible. They detailed the principle of this novel architecture, called IP-ERN, and show that this architecture is highly adaptive to the network dynamics and is compliant with every TCP feature, IPv4, IPv6 as well as IP-in-IP tunneling solutions. As a possible use case, they tested this architecture as a potential candidate to replace Performance Enhancing Proxies (PEPs) commonly-used over satellite IP-based networks. Compared to splitting PEP, the IP-ERN architecture does not break the E2E connectivity, still achieves high satellite link utilization and fairness without needs of extra fault tolerant mechanisms.JuanjoAlins, Jorge Mata-

Diaz, Jose L. Muñoz, Elizabeth Rendón-Morales, Oscar Esparza et al (2012) [56] proposed XPLIT, a new architecture based on TCP cross-layering and splitting for optimizing the transport layer performance in a DVB-S2 satellite link that employs the ETSI QoS Broadband Satellite Multimedia Services (BSM) standard. The main novelty of proposal is a complete architecture that perfectly fits this new DVB-S2/ETSI QoS BSM scenario. This architecture includes the design of satellite-optimized cross-layer TCP protocol, called XPLIT-TCP that uses two control loops to properly manage the system load. The proposal has been implemented to be tested in the NS-2 simulator and we include the most interesting performance evaluation results, which show the excellent performance of our architecture for the intended scenario. Pedro Martinez-Julia, Antonio F. Skarmetaet al (2013)[57]They proposed that the future Internet promotes the introduction of new architectures that provide the decoupling of identification and location. Moreover, new technologies, like cloud computing and Internet of things, raise the necessity for a finer granularity of network nodes. They also presented an architecture that decouples the identification and location by using identities to identify the network nodes and moving from a host-to-host to a fine-grained process-to-process view of the network. Together with the mobility and multi-homing support, it also provides integrated discovery, flexible naming, and integrated security features. Finally, they analyzed the architecture to discuss its performance and compare it with other (existing) approaches.M. SarperGokturk, OzgurGurbuz, ElzaErkipet al (2013) [58]proposed a novel decentralized cross-layer multi-hop cooperative network architecture. This cross-layer architecture introduces a new cooperative flooding scheme and two decentralized opportunistic cooperative forwarding mechanisms based on randomized coding, and a Routing Enabled Cooperative Medium Access Control (RECOMAC) protocol that enables cooperative forwarding, while incorporating physical, medium access control (MAC) and routing layers.. Essentially, in the RECOMAC architecture, the routing layer functionality is submerged into the MAC layer to provide seamless cooperative communication, while the messaging overhead to set up routes, select and actuate relays is reduced. They evaluate the performance of RECOMAC in terms of network throughput, delay and MAC and routing overhead, in comparison to the conventional architecture based on the well-known IEEE 802.11 MAC and Ad hoc On Demand Distance Vector (AODV) routing protocols. RECOMAC is shown to provide quite significant improvement by an order of magnitude difference in all investigated performance metrics.Nicholas Bastin, Andy Bavier, Jessica Blaine, Jim Chen, Narayan Krishnan, Joe Mambretti, Rick McGeer, Rob Ricci, Nicki Watts et al (2014) [59] described InstaGENI, a distributed cloud based on programmable networks designed for the GENI Mesoscale deployment and large-scale distributed research projects. The InstaGENI architecture closely integrates a lightweight cluster design with software-defined networking, Hardware-as-a-Service and Containers-as-a-Service, remote monitoring and management, and high-performance inter-site networking. The initial InstaGENI deployment will encompass 34 sites across the United States, interconnected through a specialized GENI backbone network deployed over national, regional and campus research and education networks, with international network extensions to sites across the world. W. Ramirez, X. Masip-

Bruin, M. Yannuzzi, R. Serral-Gracia, A. Martinez, M.S. Siddiquiet al (2014) [60] proposed the IP-based addressing scheme currently supporting the whole routing architecture embeds some well-known limitations that may significantly hinder the deployment of new applications and services on the Internet. The relevant consequences that addressing brings to the overall network operation is pushing the networking community to study and propose new addressing architectures that may limit or even remove the negative effects (affecting network performance) stemmed from the currently deployed addressing architecture. To this end, researchers working on this area must have a perfect understanding of the weaknesses and limitations coming up from the nowadays architecture as well as a comprehensive knowledge of the alternatives proposed so far along with the most appealing research trends. They also shows their work comes up with the aim of assisting the reader to both: (i) get insights about the most prominent limitations of the currently deployed addressing architecture, and (ii) survey the existing proposals based on ID/Locator Split Architectures (ILSAs) including an analysis of pros and cons, as well as a taxonomy aiming at formulating a design space for evaluating and designing existing and futureILSAs. Ting Wang, Zhiyang Su, Yu Xia, JogeshMuppala, MounirHamdiet al (2015) [61] proposed theData center network (DCN) architecture is regarded as one of the most important determinants of network performance. DCN architecture designs, the server-centric scheme stands out due to its good performance in various aspects. They presented the design, implementation and evaluation of SprintNet, a novel server-centric network architecture for data centers. SprintNet achieves high performance in network capacity, fault tolerance, and network latency. They also proposed a hardware based approach, named ”Forwarding Unit” to provide an effective solution to these drawbacks and improved the efficiency of server-centric architectures. Both theoretical analysis and simulations are conducted to evaluate the overall performance of SprintNet and the Forwarding Unit approach with respect to cost-effectiveness, fault-tolerance, system latency, packet loss ratio, aggregate bottleneck throughput, and average path length. The evaluation results convince the feasibility and good performance of both SprintNet and Forwarding Unit.Myungjin Lee, Mohammad Hajjat, RamanaRaoKompella, Sanjay G. Rao et al (2015) [62] introduced related sampling that allows network operators to give a higher probability to flows that are part of the same application session. In their evaluation using real traces, they shows that RelSamp achieves 5–10× more flows per application session compared to Sampled NetFlow for the same effective number of sampled packets.

Conclusions:

Planned routing algorithm (PRA) can provide the best performance while the complexity is acceptable and the hierarchical routing algorithm (HRA) can reduce processing time and improve network utilization, and both are suited for QoS requirements of ATM networks routing. A WDM star network operating under the HARP protocol achieved high performance under any load conditions. The simulation results showed that DEAR protocol achieves better system lifetime when compared to the conventional energy efficient routing protocols. Theoretical computation and

simulation results showed that data packet loss rate decreased significantly with novel Location-Enhanced On-Demand (LEOD) routing protocol compared to other methods. In addition, this protocol reduces the network control overheads and the power consumption.

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