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A Novel Approach for Improve Routing Accumulative in Multi-Hop Networks

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Abstract — In the wireless network the data transmission between the source and destination maintained by the cooperation among the two nodes. In the tradition network which data transmission between source and destination achieved through the intermediate node that can receive the information from immediate nodes and transmits to next node. Sometimes this problem in the data transmission such as delays in routing requires more energy to transmit the data. This paper investigates the problem of finding optimal paths in single-source single-destination accumulative multi hop networks. We consider a single source that communicates to a single destination assisted by several relays through multiple hops. At each hop, only one node transmits, while all the other nodes receive the transmitted signal, and store it after processing/decoding and mixing it with the signals received in previous hops. That is, we consider that terminals make use of advanced energy accumulation transmission/reception techniques, such as maximal ratio combining reception of repetition codes, or information accumulation with rate less codes. Accumulative techniques increase communication reliability, reduce energy consumption, and decrease latency. We investigate the properties that a routing metric must satisfy in these accumulative networks to guarantee that optimal paths can be computed with Dijkstra's algorithm. We model the problem of routing in accumulative multi-hop networks, as the problem of routing in a hyper graph. We show that optimality properties in a traditional multi-hop network (monotonicity and isotonicity) are no longer useful and derive a new set of sufficient conditions for optimality. We illustrate these results by studying the minimum energy routing problem in static accumulative multi-hop networks for different forwarding strategies at relays. Proposed system enables significant performance through the shortest path routing.

Keywords — routing, networks, increase communication reliability, reduce energy consumption, and decrease.

I. Introduction

In the today's era of the network the relays concept widely used is relay channeling. Compared to traditional system in this, nodes use the information of all nodes instead of nearest one. This concept first proposed by van der Meulen. In this system the relay channel considers one relay assisted to information transmitted between source and destination. This has strong control over the data transmission in the routing in good rates. In this system addressed the problem of Accumulative multi-hop network routing in the communication between two nodes. The communication between two nodes through the single source to single destination which is accumulated with relays gained from the immediate nodes. The accumulation is done by two ways energy accumulation decoded packet after all energy received from the source node. In the data transmission multi-hop data, we mainly focus on decode and forward strategy while transferring the information from single source to destination. The mutual data accumulated until full message decoded. This can become fully aware of rate fewer codes such as fountain raptor code. This increases the reliability and decreases the energy requirement in the transmission. Studied the problem of routing in multi-hop wireless network using the accumulation of optimal mutual information with help of distress optimality.

In this article, the computational entities are called *computers* or *nodes*. A distributed system may have a common goal, such as solving a large computational problem.] Alternatively, each computer may have its own user with individual needs, and the purpose of the distributed system is to coordinate the use of shared resources or provide communication services to the users.

Other typical properties of distributed systems include the following:

- The system has to tolerate failures in individual computers.

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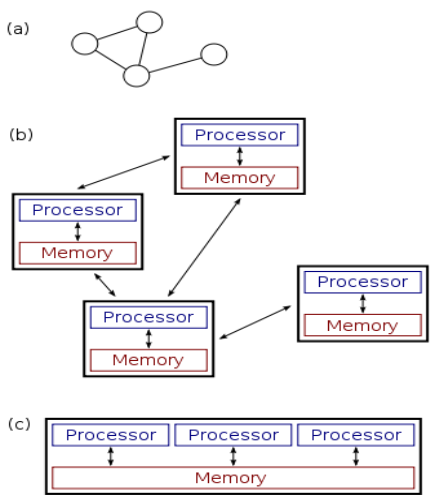
- The structure of the system (network topology, network latency, number of computers) is not known in advance, the system may consist of different kinds of computers and network links, and the system may change during the execution of a distributed program.
- Each computer has only a limited, incomplete view of the system. Each computer may know only one part of the input.

Distributed systems are groups of networked computers, which have the same goal for their work. The terms "concurrent computing", "parallel computing", and "distributed computing" have a lot of overlap, and no clear distinction exists between them. The same system may be characterised both as "parallel" and "distributed"; the processors in a typical distributed system run concurrently in parallel. Parallel computing may be seen as a particular tightly coupled form of distributed computing, and distributed computing may be seen as a loosely coupled form of parallel computing. Nevertheless, it is possible to roughly classify concurrent systems as "parallel" or "distributed" using the following criteria:

- In parallel computing, all processors may have access to a shared memory to exchange information between processors.
- In distributed computing, each processor has its own private memory (distributed memory). Information is exchanged by passing messages between the processors.



The figure on the right illustrates the difference between distributed and parallel systems. Figure (a) is a schematic view of a typical distributed system; as usual, the system is represented as a network topology in which each node is a computer and each line connecting the nodes is a communication link. Figure (b) shows the same distributed system in more detail: each computer has its own local memory, and information can be exchanged only by passing messages from one node to another by using the available communication links. Figure (c) shows a parallel system in which each processor has a direct access to a shared memory.

The situation is further complicated by the traditional uses of the terms parallel and distributed *algorithm* that do not quite match the above definitions of parallel and distributed *systems*; see the section Theoretical foundations below for more detailed discussion. Nevertheless, as a rule of thumb, high-performance parallel computation in a shared-memory multiprocessor uses parallel algorithms while the coordination of a large-scale distributed system uses distributed algorithms.

EXISTING SYSTEM:

- ❖ The problem of routing in *accumulative multi-hop* (AM) communication networks, in which we are instead interested here, is however far from being understood today. In the simplest accumulative multi-hop network, a single source communicates to a single destination assisted by several relay nodes that can accumulate the received energy/information from previous relay transmissions.
- ❖ In practice, there are two main accumulation mechanisms at relays: energy and mutual-information accumulation. Energy accumulation can be performed at the receiving nodes, e.g., through spacetime coding or repetition coding.
- ❖ Mutual-information accumulation can be realized using rateless codese.g. fountain or raptor codes. Accumulation mechanismsare considered in current and next generation standards sincethey increase communication reliability and reduce energyconsumption.

DISADVANTAGES OF EXISTING SYSTEM:

- ❖ More Energy utilized
- ❖ Latency is High.

Proposed System:

- ❖ The work presented here builds, mainly, on top of the works conducted show that the AM network communication routing problem cannot be represented using graphs, and thus, the optimality conditions derived in existing for routing over graphs cannot be invoked.

- We instead show that, in general, the AM routing problemneeds to be modeled using hypergraphs. We then find newconditions to guarantee the optimality of Dijkstra's algorithmin hypergraphs. These conditions are only sufficient but notnecessary.Equipped with these optimality conditions, we discuss theoptimality of Dijkstra's algorithm for the minimum energyrouting problem in static AM networks. To that end, we focusmainly on decode-and-forward (DF) based relaying strategies.
- DF relay nodes decode the source message completely byaccumulating energy, or information from all previous transmissions.This routing problem has been previously addressed,we already knowthat finding the optimal transmission order for these networksis an NP-complete problem.
- Our approach here consist instead on identifying particularDF AM network situations for which the routing problemcan be represented either using graphs that satisfy Dijkstra'soptimality conditions, or using hypergraphs that satisfythe new optimality conditions found here.

ADVANTAGES OF PROPOSED SYSTEM:

- The proposed DF EAM algorithm improves the RPARalgorithm by more than 5% and the SP algorithm by more than25% for networks with more than 5 nodes
- Finds theoptimal path in such networks, and presented sufficient conditionsfor the optimality.

3. Implementation

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective.

The implementation stage involves careful planning, investigation of the existing system and it's constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods.

System Construction Module

In the first module, we develop the system with the system with the entities required to implement and evaluate the proposed model. We develop the system with entities: Data Node, Nodes and Bank Node. The system is developed; such that the data node has the feature of uploading any dataset values in it and we developed it by uploaded excel file dataset for it. The Nodes are developed with the Socket programming concept and "n" number of nodes can be created by the user. The nodes can be name such that: N0, N1, N2…Nn. The Bank nodes has the option of getting the user query and processing it through the Nodes as routers and display the results from the Data Node.

Router Operation

In this module, we develop the Router Operation process. Our objective is to model the relationship between link power consumption and traffic volume. We first present the router operation backgrounds and our modeling details. Then we use simulations and experiments to validate our modeling. A link between two routers is physically connected with two line cards, and the line cards consume the majority power of the routers. We thus use link power consumption to abstract the power consumption of the line cards.

Power Modeling

The power model we proposed is based on analysis and measurements on real routers. Similar results are reported in a recent independent work. The main difference we made is the stair-like behavior when line cards in a trunk link can be switched off individually. Again, we emphasize that we focus on network layer devices (routers) in this paper. Although routers made by different vendors have different power consumptions, we believe that the stair-like relationship between power consumption and traffic holds for modern routers that operate in a modular fashion.

Routing Dynamics

The traffic in a network changes much frequently than the topology does. This may lead to frequent routing computations in Green-HR, which may incur routing oscillations. Furthermore, transient routing micro-loops may be incurred. Such loops may only be induced during the process of routing convergence, and are different from that induced by a link weight structure which is not isotonic. It is natural to discuss such routing dynamics of Green-HR. Routing oscillations may be incurred when the traffic on a path is affected by a routing computation, and this traffic change in turn affects the path weight and triggers another routing computation. We show that Green-HR does not have such a situation. For Dijkstra-Green-B, the path weight is determined by a virtual traffic volume. However, we can use the average traffic volume of a long period to weaken the affection of current routing change and avoid a routing oscillation.

4. Literature Survey

Ivana Maric and Roy D. Yates addressed the problem of minimum energy broadcast problem. The nodes collect the energy while transmitting the messages. They studied cooperative strategy for energy accumulation and mainly focused on the synchronized, low power network. That uses the local information to broadcast on the network. To overcome lower energy problem proposed the two way approach first identification of nodes ordering in which message has to be a pass. Other is finding of the power to that order. Among those second problem is solved by using the linear programming and used an algorithm for ordering nodes. Experimented it and the result shows the better performance

N. Vasic, P. Bhurat, D. Novakovic, M. Canini, S. Shekhar, and D. Kostic

The power consumption of the Internet and datacenter networks is already significant, and threatens to shortly hit the power delivery limits while the hardware is trying to sustain ever-increasing traffic requirements. Existing energy-reduction approaches in this domain advocate recomputing network configuration with each substantial change in demand. Unfortunately, computing the minimum network subset is computationally hard and does not scale. Thus, the network is forced to operate with diminished performance during the recomputation periods. In this paper, we propose REsPoNse, a framework which overcomes the optimality-scalability trade-off. The insight in REsPoNse is to identify a few energy-critical paths off-line, install them into network elements, and use a simple online element to redirect the traffic in a way that enables large parts of the network to enter a low-power state. We evaluate REsPoNse with real network data and demonstrate that it achieves the same energy savings as the existing approaches, with marginal impact on network scalability and application performance.

S. Avallone and G. Ventre

A number of studies report that ICT sectors are responsible for up to 10% of the worldwide power consumption and that a substantial share of such amount is due to the Internet infrastructure. To accommodate the traffic in the peak hours, Internet Service Providers (ISP) have overprovisioned their networks, with the result that most of the links and devices are under-utilized most of the time. Thus, under-utilized links and devices may be put in a sleep state in order to save power and that might be achieved by properly routing traffic flows. In this paper, we address the design of a joint admission control and routing scheme aiming at maximizing the number of admitted flow requests while minimizing the number of nodes and links that need to stay active. We assume an online routing paradigm, where flow requests are processed one-by-one, with no knowledge of future flow requests. Each flow request has requirements in terms of bandwidth and m additive measures (e.g., delay, jitter). We develop a new routing algorithm, E2-MCRA, which searches for a feasible path for a given flow request that requires the least number of nodes and links to be turned on. The basic concepts of E2-MCRA are look-ahead, the depth-first search approach and a path length definition as a function of the available bandwidth, the additive QoS constraints and the current status (on/off) of the nodes and links along the path. Finally, we present the results of the simulation studies we conducted to evaluate the performance of the proposed algorithm.

A. Cianfrani, V. Eramo, M. Listanti, M. Marazza, and E. Vittorini

In this paper we analyze the challenging problem of energy saving in IP networks. A novel network-level strategy based on a modification of current link-state routing protocols, such as OSPF, is proposed; according to this strategy, IP routers are able to power off some network links during low traffic periods. The proposed solution is a three-phases algorithm: in the first phase some routers are elected as "exporter" of their own Shortest Path Trees (SPTs); in the second one the neighbors of these routers perform a modified Dijkstra algorithm to detect links to power off; in the last one new network paths on a modified network topology are computed. Performance study shows that, in an actual IP network, even more than the 60% of links can be switched off.

Conclusion

In this paper, our solution studied the routing in a multi-hop network that can minimize the delay and energy consumption using mutual information. The approaches such as fountain code, rate less code that is used for routing purpose and metrics to formulate the network. Energy and mutual information accumulation using relays can be used to find an optimal path using multigraph techniques and reduce communication delay.

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Good Teachers are worth more than thousand books, we have them in Our Department.

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