Dual Gate Routing Protocol by using Redundancy Protocol

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ABSTRACT
In this paper we present some redundancy routing protocols for dual gate networking of a cellular network. To perform routing protocols We have to explain the networking communication on wireless sensor networks which can vary from a simple star network to an advanced multi-hop wireless mesh network like MANET & VANET which is adhoc networks for vehicular and mobile networks by using Dual gate Protocols. After performing the routing through the centralized management system in cellular network, requester Ad-Hoc node forwards data via its Wi-Fi interface according to the discovered route in the Ad-Hoc mode by using redundancy protocols. This paper also study the principles and features of selecting protocols like ospf(open shortest path first), eigrp(enhanced-igrp) for explaining and comparing the prons and cons of routing protocols. So In this paper we will review the dual gate routing protocol by using redundancy protocol

Keywords
Ad-Hoc networks; cellular networks;Dual Gate;VANET;MANET; Fet Amplifier; OSPF; RIGRP

1. INTRODUCTION
Wireless sensor network consists of spatially distributed sensor to observe environmental and physical conditions such as sound, pressure,temperature to pass their data through the network to main location. It have 1000's of nodes,where each node is connected to one sensors.Each sensor network node has typically several parts: a radio transceiver with an internal antenna,usually a battery or an embedded form of energy harvesting. WSNs can vary from a simple star network to an advanced multi-hop wireless mesh network. In information technology, a protocol is the special set of rules that end points in a telecommunication connection use when the y communicate. Protocols exist at several levels in a telecommunication connection. MANETs stands for" mobile adhoc networks" MANETs are mobile, they use wireless connections to connect to various networks.It have high data transmission rate,multihop transmission rate.They are capable to perform routing in distributed ways.

A VANET(Vehicular Ad-hoc Networks) is based on smart cars and base-stations, which share information via wireless communication. Due to rapid change in topology and frequent disconnection makes it difficult to design an efficient routing protocol for routing data among vehicles, called V2V or vehicle to vehicle communication” VANETs are a kind of MANETS provide vehicle to vehicle (V2V) and vehicle to roadside wireless communications. And finally, most vehicles are restricted in their range of motion, for example by being constrained to follow a paved highway. Vehicular Ad-hoc Networks are expected to implement a variety of wireless technologies such as Dedicated Short Range Communications (DSRC) which is a type of WiFi. Other candidate wireless technologies are Cellular, Satellite, and WiMAX. Vehicular Ad-hoc Networks can be viewed as component of the Intelligent Transportation Systems (ITS). In a wireless sensor network, wireless transmission consists of three major operations :

(1) convert data into radio waves.
(2) amplify radio waves until reaching the receiving sensors.
(3) receiving sensors receive data

2. RELATED WORK
There are several protocols are used to integrate cellular and ad hoc network. The growing of people mobility ,there are several problems: traffic congestion, fatalities and injuries.

In this , we use VANETs that offers several benefits to organizations of any size. While such a network does pose certain safety concerns (for example, one cannot safely type an email while driving), this does not limit VANET’s potential as a productivity tool. Restarting of wireless sensor components from sleep mode frequently may consume more energy than that saved by staying in sleep mode. Some researchers proposed adjusting the communication range of each sensor to just enough short distance. This adjustment is usually based on optimization.

3. DUAL GATE
Dual Gate, reserve gate, two-gate system, separate gate is a procedure that serves to isolate a complaining or striking union and employer

3.1 Requirements for Dual Gate Router : A router is connected to two or more data lines from different networks.
Existing routing protocol
1. Internet routing protocol
2. Ad Hoc routing protocol

3.2 Gateway
A gateway is a network point that acts as an entrance to another network. On the Internet, a node or stopping point can be either a gateway node or a host (end-point) node.

3.3 Networks
A network is a group of two or more computer systems linked together.

3.4 Nodes
A node is any device connected to a computer network. Nodes can be computers, personal digital assistants, cell phones, or various other network (PDAs).
4. BASICS DUAL GATE FET

One often hear the single gate FET referred to as the equivalent of the triode vacuum tube. In this sense, the dual gate FET is then the solidstate analog of the multigrid vacuum tube. The comparison can’t be carried to far but. In general, it is true that the dual gate FET can perform best in those application s where multigrid vacuum tubes are frequently used. Unlike the vacuum tube, however, where all sorts of problems developed because of transit time effects between elements and which cause noise and distortion, these effects are not present in the dual gate FET.

Figure 1 is a representation of a single gate FET. This type is usually called a junction type because there exists an NP junction between the gate and drain-source P-type semiconductor material. Although the gate is operated biased to the source so that no current flows through the junction, the presence of the interface creates problems which reduce the gate input impedance to less than its optimum value.

Figure 5.1 is an extension of fig.1, so called four terminal junction gate FET. In effect it can considered to have two parallel gate. Figure 5.2 shows the representative construction of a single gate MOSFET. The gate actually consists of a metal electrode which is separated from the N-type drain-source material by a very thin layer of silicon dioxide.

5. PRINCIPLES OF SELECTING A ROUTING PROTOCOLS:

With the rapid development of Internet, TCP/IP has been in mainstream protocol. Many different types of routers running in the network carry the most important information. Without routing protocols, these routers can’t work together in phase. So when we begin to design a large-size network, choosing a suitable routing protocol is very important. Commonly used unicast routing protocols include RIP, IS-IS, BGP as well as Cisco private protocols of IGRP/EIGRP. According to the scale of network, you can select different protocol. Connectivity is most fundamental requirements of IP network; this is the base of protocol choice. Other factors such as network typology, network management also should be considered:

1) Compatibility of protocols: Compatibility of protocols makes sure connectivity and expansibility of network, because different manufactures can support these protocols. And customers also have more choice.

2) Typology of network: Typology of network has direct influence on protocol choice. For example RIP is not suitable for complicated network, because its coverage is limited to a certain degree. So we need more powerful protocols, such as OSPF, EIGRP.
3) Strong and Stable: Being the signaling protocol to ensure network connectivity, the routing protocols must be strong and stable. Various abnormalities will appear in the network such as hardware error or heavy load. Because routers locate at the decision-making points of the network, if routers have error, they may cause unpredictable network behavior. Routing protocols must be able to bear various abnormalities for a long time.

4) Best path selecting: Routing protocols aim at finding the best path in the network to ensure its connectivity. Each routing protocol has its own standard to judge a route quality (the judging parameters include next hop number, bandwidth and delay etc. Generally these parameters are quantified with “metric” for route data). To ensure the best network path, we should select proper measurement for different network environments.

5) Management and security: Dividing the autonomous system into different areas will decrease the possibility of route cycle or route unreachable; It also makes management of network more easy. And we also should consider security and strategy of routing information transmitting. According to these principles, open and standard, as well as robust of protocols are highly considered.

6. THERE ARE TWO TYPES OF ROUTING PROTOCOLS

6.1 OSPF(Open Shortest Path First)
6.2 EIGRP(Enhanced-IGRP)

6.1. OSPF(Open Shortest Path First)

OSPF is the abbreviation of Open Shortest Path First. It is an internal routing protocol of the autonomous system based on link state developed by IETF. In IP networks, it dynamically finds and propagates routes by collecting and forwarding autonomous system link state. Each router that runs OSPF protocol always describes the local network connection state (such as valid interface information and reachable neighbor information) with LSA (link state advertisement) and advertises it to the whole autonomous system. Thus, each router receives the LSA generated by all routers within the autonomous system. The LSA collection then forms LSDB (link state database). Because each LSA is the description of the surrounding network topology of a router, the whole LSDB is then the actual reflection of the autonomous system network topology. Based on LSDB, the routers run the SPF (Shortest Path First) algorithm. Build a shortest path tree that takes itself as the root, and the tree gives out the route to nodes in the autonomous system. In graph theory, “tree” is a connection figure without loops. Therefore, routes calculated by OSPF are born to be without loops.

To reduce self-overhead, OSPF protocol brings out following concepts:

1. DR: In the various multi-address access networks if there are two or more routers, the network should elect a DR (designated router). DR responds to the LSDB synchronization of all routers in the network segment. Thus two non-DR routers need not make LSDB synchronization, which can greatly reduce bandwidth overhead in the same network segment.

2. ABR: OSPF can divide the autonomous system into different areas according to the topology. Thus when the area border router (ABR) transmits routing information to other areas, it generates the brief LSA with the unit of segment. It will decrease the LSA number in the autonomous system and complexity of route calculation.

OSPF adopts four classes of routes that are arranged as follows with priority:

Internal routing
Inter-area routing
Type one external routing
Type two external routing

Internal area route and inter-area route describes the internal network structure of the autonomous system, while external route describes how to choose routes to destinations outside the autonomous system. Generally, type one external routes correspond to the information introduced by OSPF from other internal routing protocols. Costs of these routes and costs of OSFP route itself are comparable. Type two external routes correspond to the information introduced by OSPF from external routing protocols. Costs of these routes are much larger than costs of OSPF route itself; so only external costs are considered for calculation.

6.1.1 OSPF Features

OSPF is a well developed routing protocol. It is suitable for most of networks, especially enterprise network. It has features such as:

1) OSPF is a real loop-free routing protocol: It benefits from the algorithm itself (Link state and shortest path first algorithm).
2) Fast convergence: Transmitting routing changing information through whole AS and recalculating routes in very short time.
3) Support equal cost load balancing.
4) OSPF divides the autonomous system into different areas according to the topology. Thus when the area border router (ABR) transmits routing information to other areas, it generates the brief LSA with the unit of segment. It will decrease the LSA number in the autonomous system and complexity of route calculation. So the route information will not increase very rapidly with network expanding.
5) Overload is as small as possible:
6) OSPF adopts restrict four classes of routes to provide more reliable routes choice.
7) OSPF support two types of packet authentication modes. One is the common clear text authentication mode; the other is the cipher text authentication mode with MD5 algorithm.
8) OSPF is suitable for any size network, and in can support thousands routers at most.
9) OSPF can expand to support Traffic engineering because of link-state awareness.

6.2 EIGRP

EIGRP and early IGRP are released by Cisco. They’re both distance vector protocols. EIGRP is enhanced edition of Interior Gateway Routing Protocol. Though it adopts distance vector algorithm, it has some features of link state protocol. EIGRP has improved a lot compared to IGRP; it relies on the Diffused Update Algorithm (DUAL) to calculate the shortest path a destination within a network. It is totally loop-free, and has very fast convergence speed among all the routing protocols.
6.2.2: EIGRP Features
EIGRP has features as below:
1. Accurately routing load calculating and heterogeneous network protocols supporting. EIGRP inherits advantages of IGRP. EIGRP calculates routes according to information such as network bandwidth, total delay, path reliability, path loading, so the routes table is more accurate. EIGRP also support IPX, CLNP.
2. Low usage of network resource. During normal operation, usage of network resource is very low; only hello packets are transmitted on a stable network. When a change occurs, only routing table changes are propagated, not entire routing table; this reduces the load the routing protocol itself places on the network. EIGRP also can control the packets transmission and reduce the usage of interface bandwidth, so it can avoid influence to normal services data packets.
3. Loop-free and fast convergence. EIGRP uses DUAL, only routing table changes are propagated; and to one route, only relative routers will recalculates.
4. The cipher text authentication mode with MD5 algorithm is supported.
5. Variable Length Subnet Mask routes aggregation. EIGRP support Variable Length Subnet Mask routes aggregation by configuration, is reduces transmission of routing information and save bandwidth.
6. Support load-balance over equal cost or unequal cost. EIGRP can send traffic in proportion over several unequal cost paths, this promotes the utility rate of network resource; but is also increase workload of routers, so this way is not commended even by Cisco.
7. Configuration is simple. There's no complicated area setting and it need not adopt different configuration to different network interface. It only needs to start EIGRP process on routers, and uses network command to configure interface.

6.3 Compare OSPF to EIGRP
Both OSPF and EIGRP are fast convergence routing protocols, both are using algorithm which are loop free, secure, and take up small bandwidth. Nevertheless, from the analysis of the previous chapters, we can see that each has it own strong points and weak points.

6.3.1 Disadvantages of OSPF
1) The complexity of configuration: because of the complexity of network attribute and dividing areas when running OSPF, the network administrators need to possess solid knowledge of data communication and computer networks in order to make OSPF working well, with OSPF getting more and more popular, this is not considered a big problem.
2)  can not support unequal load balance: OSPF creates the metric of a link based on the bandwidth of the link by default, OSPF only picks path with the smallest metric towards the same destination (OSPF supports equal metric load balance). OSPF does not support unequal load balance. This is not like EIGRP, which supports unequal path load balance by configuration.

6.3.2 Disadvantages of EIGRP
1) There is no area in EIGRP, so it is not good at dealing with big hierarchy network. When running OSPF on a big network, we can make the network hierarchy by dividing the network into some areas. Obviously, EIGRP is not a good choice for a big network. This is also a restriction of distance-vector routing protocol (like RIP, RIPII). If EIGRP be a routing protocol for a big network, we can separate the network into different EIGRP domain, then import routing table to each other, but it is not a optimal network design, and very few network has been designed like this.
2) It does not support DoD: EIGRP maintains the adjacency relationship by sending HELLO message to each other periodically, even though running on dial up link. However, the HELLO message may bring the dial link up, this is not what we want on a dial up link, and especially the dial up link is a backup link. When we run EIGRP on a dial up link, in order to prevent this from happening, we usual put a Dialer list and Dialer group on the interface so as not to let the HELLO message bring the dial link up. By doing this way, we sacrifice the router resource. OSPF takes advantage at this point by supporting DoD, Dial on Demand.
3) The fast convergence and loop free characteristics are based on the EIGRP DUAL algorithm. Basically, the DUAL algorithm is working by sending query to its neighbor about the active routes(uncertainty routes), then convergence upon receiving the reply. If the routes are uncertainty routes for its neighbors too, the neighbors send out query to their neighbors, the process will be going on and on until get the reply or after a certain time, the routes will be considered not available and get purged from the routing table. Thus in some cases, the active routes will be put into "stack in active" status for quit a long time, this affect the fast convergence seriously. OSPF does not have this problem. Although EIGRP is also fast convergence routing protocol, when working on some special topology, EIGRP is fairly slow. For instance, in a long and narrow network, if something has changed, it would take EIGRP a long time to send the message from one side to the other side.
4) In a broadcast network, EIGRP sets up a full mesh adjacency relationship with each other, the routers exchange information with other. This would waste a lot of bandwidth. OSPF does not work like this, OSPF elects DR and BDR instead. The DR other routers only need to set up adjacency with DR, and exchange link state advertisement with DR in the network. That will save a lot of bandwidth.
5) EIGRP is a protocol come up with by Cisco, it is a private protocol, not a open standard, Cisco is the only company who has the right to use it and make change of it. Cisco has the right to make any change of the protocol as they want without having to inform any customers and other vendors, this would be a big security concern for customers. Besides, If customers choose to run EIGRP on their network, they are no way to choose other vendors products when they upgrade their network afterwards. This is unfair both for customers and other vendors. On the contrary, OSPF is a open standard routing protocol, come up with by IETF. Most the mainstream vendors in this industry support it, so the compatibility among different vendors is guaranteed. Under the support of many vendors, the protocol will be getting better and better.

7. CONCLUSION
Protocols for integrated cellular and Ad-Hoc networks. Compared to AODV and DSR, our routing protocols is able to establish more optimal routes redundancy in wireless communication. Routing in sensor networks is a new area of research, with a limited but rapidly growing set of research results. In this article we present a comprehensive survey of routing techniques in wireless sensor networks that have been presented in this literature. They have the common objective of trying to extend the lifetime of the sensor network while not
compromising data delivery. Overall, the routing techniques are classified based on the network structure into three categories: flat, hierarchical, and location-based routing protocols. Furthermore, these protocols are classified into multipath-based, query-based, negotiation-based, and QoS-based routing techniques depending on protocol operation. We also highlight the design trade-offs between energy and communication overhead savings in some of the routing paradigm, as well as the advantages and disadvantages of each routing technique. This paper has presented an evaluation of typical approaches proposed for designing high speed routers. In this paper we explained and reviewed the dual gate protocols on communication networking.

8. FUTURE WORK
IP provides an amazing degree of flexibility in building large and arbitrary complex networks. Interworking routers capable of forwarding aggregate data. We have focused primarily on the architectural overview and the design of the components that have the highest effect on performance. First, we have observed that high-speed routers need to have enough internal bandwidth to move packets between its interfaces at multigigabit and terabit rates. The router design should use a switched backplane. The processing time of these tasks does not decrease linearly if faster processors are used. This is because of the sometimes dominating effect of memory access rate. Experience has shown that while an IP router must, in general, perform a myriad of functions, in practice the vast majority of packets need only a few operations performed in real-time. Thus, the performance critical functions can be implemented in hardware (the fast path) and the remaining (necessary, but less time-critical) functions in software (the slow path). IP contains many features and functions that are either rarely used or that can be performed in the background of high-speed data forwarding (for example, routing protocol operation and network management). The router architecture should be optimized for those functions that must be performed in real-time, on a packet-by-packet basis, for the majority of the packets. This creates an optimized routing solution that route packets at high speed at a reasonable cost. The cost of a router port is also proportional to the type and size of memory on the port. SRAMs offer faster access times, but are more expensive than DRAMs. So finally The cost of a router port is also determined by the complexity of the internal connections between the control paths and the data paths in the port card. In some designs, a centralized controller sends commands to each port through the switch fabric and the port's internal buffers. Careful engineering of the control protocol is necessary to reduce the cost of the port control circuitry and also the loss of command packets which will certainly need retransmission. Significant advances have been made in router designs to address the most demanding customer issues regarding high speed packet forwarding (e.g., route lookup algorithms), Extensive work is being carried out both in the research community and industry to address these problems.

8. REFERENCES