Review on Dynamic rerouting behavior

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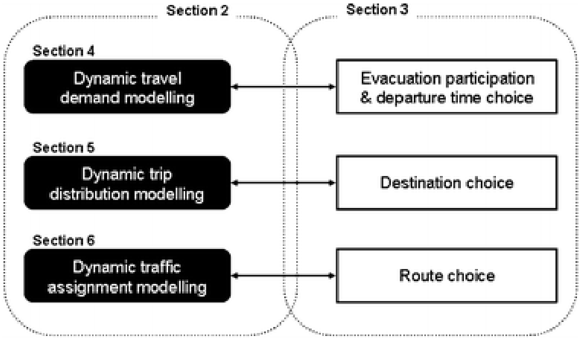
Abstract- **This project investigates to what extent users change their route when faced with unexpected traffic situation or to face congestion in network due to havy traffic. To this end, traffic data from days with serious incidents are analyzed in this contribution. The flows retrieved from loop detectors on the routes past the incident and on alternative routes are compared with the same values on days without an incident. It is found that for major accidents up to 50% of the users deviate from their normal route if the traffic situation is different. Furthermore, more users take an alternative route if the delay on the original route is caused by an accident than if they are faced with the same delay on the original route without an incident. These findings are for instance important for providing route information or suggestions on alternative routes or for finding vulnerable links.**

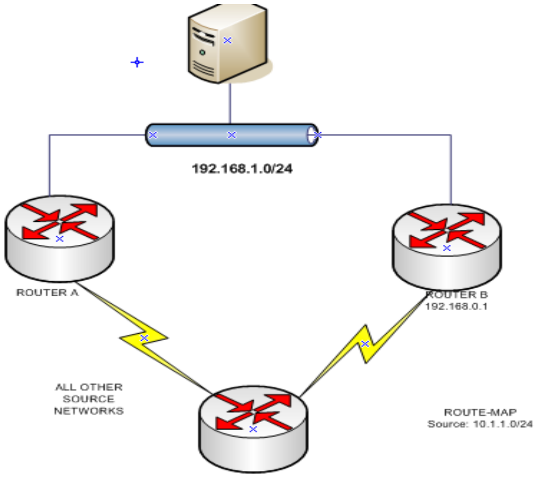
Index Terms- **AOMDV, WSN, AAR, WSN**

I. INTRODUCTION

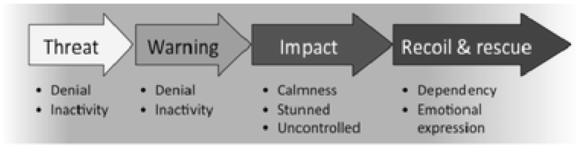
Currently, there is an ongoing debate in the traffic flow community concerning the correct empirical and theoretic- cal description of the observations reported in [?]. Mainly three candidates are striving to describe the empirical observations. Following a good tradition, we will call those different approaches hypotheses in the following. Their final goal is to explain (or, a bit more cautious, to describe) the various traffic flow patterns. The different models itself will be described in this text from the perspective of microscopic traffic flow models, and we rely on the most simple of those models. These simple models are not capable to deliver a thorough microscopic description of traffic flow (which still needs to be worked out) this would require to incorporate lane-change phenomena as well as the tactical level of decision making of human drivers Nevertheless, it is hoped for that they capture the main macroscopic features, i.e. the patterns of traffic flow observed in reality. In this project, dynamic rerouting behavior is considered in day-to-day traffic assignment models to capture travelers' reactions to advanced information. The properties of a dynamic rerouting weight function are studied using survey data. Our goal is to better understand the dynamic evolution of network flow. In the model, the rerouting weight varies dynamically with the cost difference between users' estimated and expected costs. The linear stability of the equilibrium is analyzed. Both theoretical analyses and numerical simulations indicated that dynamic rerouting behavior increases the stability domain and decreases the parameter sensitivity. For this purpose we want to recreate a pattern in Simulator domain. Find out the fastest path between any two nodes for data transmission. For travellers, choosing the best route is a very difficult.



Dynamic alternating routing is a simple but effective dynamic routing strategy, which is decentralized and only uses local information. In particular, the only information required is whether trunk reservation thresholds have been exceed on a route, and the current recommended alternative route. The information can be localized even further by limiting knowledge to outgoing links from an exchange rather than a route, and thus the scheme uses only as much information as AAR, with the additional stored information of the current best alternative. Thus DAR stands in marked contrast to the scheme of Bell-Northern, and AT&T's DNHR.



The former is centralized, time-delayed and requires detailed information about circuit occupancies and traffic arrivals, whereas the latter uses a large off-line calculation to advise on choices of alternative routes which can change hourly, coupled with la dynamic part similar in spirit to the scheme of Bell-Northern. This paper starts by obtaining bounds which hold for any dynamic routing scheme, and the performance of DAR is compared with such bounds. A simple analytical model is then developed which enables DAR to be modeled on both large and small networks. Empirical validation of the model and a number of examples are discussed. Any dynamic routing strategy has implications for dimensioning, and a simple way of introducing flexibility into a network is given. In addition, the setting of trunk reservation parameters is discussed, such controls being necessary to achieve high performance and prevent instability. Lastly ways of extending DAR are mentioned.



II. IMPLEMENTATION OF DYNAMIC REROUTING BEHAVIOR

For this implementation of DRB, first of all we route some protocol design. For this we have to introduce a new routing protocol that is called as Ad hoc on demand multipath distance vector routing (AOMDV).

Ad hoc on-demand multipath distance vector routing (AOMDV)

We develop an on-demand, multipath distance vector routing protocol for Cognitive cellular networks. Specifically, we propose multipath extensions to a well-studied single path routing protocol known as ad hoc on-demand distance vector (AODV). The resulting protocol is referred to as ad hoc on-demand multipath distance vector (AOMDV). The protocol guarantees loop freedom and disjointness of alternate paths. Performance comparison of AOMDV with AODV using ns-2 simulations shows that AOMDV is able to effectively cope with mobility-induced route failures. In particular, it reduces the packet loss by up to 40% and achieves a remarkable improvement in the end-to-end delay (often more than a factor of two). AOMDV also reduces routing overhead by about 30% by reducing the frequency of route discovery operations.

One of the key challenges in such networks is to design dynamic routing protocols that are efficient, that is, consume less overhead. On demand multipath protocols discover multiple paths between the source and the destination in a single route discovery. So, a new route discovery is needed only when all these paths fail. In contrast, a single path protocol has to invoke a new route discovery whenever the only path from the source to the destination fails. we develop a new on-demand multipath protocol called ad hoc on-demand multipath distance vector (AOMDV). AOMDV is based on a prominent and well-studied on-demand single path protocol known as ad hoc on-demand distance vector (AODV). AOMDV extends the AODV protocol to discover multiple paths between the source and the destination in every route discovery. Multiple paths so computed are guaranteed to be loop-free and disjoint.

Protocol Overview

AOMDV shares several characteristics with AODV. It is based on the distance vector concept and uses hop-by-hop routing approach. Moreover, AOMDV also finds routes on demand using a route discovery procedure. The main difference lies in the number of routes found in each route discovery. In AOMDV, RREQ propagation from the source towards the destination establishes multiple reverse paths both at intermediate nodes as well as the destination. Multiple RREPs traverse these reverse paths back to form multiple forward paths to the destination at the source and intermediate nodes. Note that AOMDV also provides intermediate nodes with alternate paths as they are found to be useful in reducing route discovery frequency. The core of the AOMDV protocol lies in ensuring that multiple paths discovered are loop-free and disjoint, and in efficiently finding such paths using a flood-based route discovery. AOMDV route update rules, applied locally at each node, play a key role in maintaining loop-freedom and disjointness properties. Here we discuss the main ideas to achieve these two desired properties. Next subsection deals with incorporating those ideas into the AOMDV protocol including detailed description of route update rules used at each node and the multipath route discovery procedure. AOMDV relies as much as possible on the routing information already available in the underlying AODV protocol, thereby limiting the overhead incurred in discovering multiple paths. In particular, it does not employ any special control packets. In fact, extra RREPs and RERRs for multipath discovery and maintenance along with a few extra fields in routing control packets (i.e., RREQs, RREPs, and RERRs) constitute the only additional overhead in AOMDV relative to AODV.

Loop freedom

Two issues arise when computing multiple loop-free paths at a node for a destination. First, which one of the multiple paths should a node offer or advertise to others? Since each of these paths may have different hop counts, an arbitrary choice can result in loops. Second, which of the advertised paths should a node accept? Again, accepting all paths naively may cause loops.

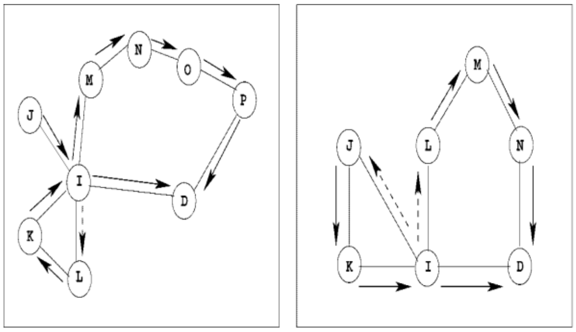
Figure illustrates these problems using simple examples. In Figure (a), node D is the destination and node I has two paths to D—a five hop path via node M (I – M – N – O – P – D), and a direct one hop path (I – D). Suppose that I advertises the path I – M – N – O – P – D to node J and then the path D through I, but each of them has a different hop count. Later, if I obtains a four hop path to D from L (L – K – I – D), I cannot determine whether L is upstream or downstream to itself, as only the hop count information is included in the route advertisements. So I form a path via L resulting in a loop. Such a situation occurs because a node (I here) advertises a shorter path (I – D) when it also has an alternate longer path (I – M – N – O – P – D). Figure (b) shows another potential loop situation. Here node D is the destination. Node J has a three hop path to D via K (J – K – I – D). Node L also has a three hop path to D via M (L – M – N – D). Suppose I obtain a four hop path to D from L. In this case, I cannot ascertain whether or not L is an upstream node because J can also provide a four hop path to D. Therefore, accepting a longer path after having advertised a shorter path to neighbors may cause a routing loop Based on the above discussion, we formulate below a set of sufficient conditions for loop-freedom. These conditions allow multiple paths to be maintained at a node for a destination.

Sufficient Conditions

1. Sequence number rule: Maintain routes only for the highest known destination sequence number. For each destination, we restrict that multiple paths maintained by a node have the same destination sequence number. With this restriction, we can maintain a loop freedom invariant similar to AODV. Once a route advertisement containing a higher destination sequence number is received, all routes corresponding to the older sequence number are discarded. However, as in AODV, different nodes (on a path) may have different sequence numbers for the same destination.
2. For the same destination sequence number, (a) Route advertisement rule: Never advertise a route shorter than one already advertised. (b) Route acceptance rule: Never accept a route longer than one already advertised.

Besides maintaining multiple loop-free paths, AOMDV seeks to find disjoint alternate paths. For our purpose of improving fault tolerance using multiple paths, disjoipaths are a natural choice for selecting an effective subset of alternate paths from a potentially large set because the likelihood of their correlated and simultaneous failure is smaller compared to overlapping alternate paths. We consider two types of disjoint paths: link disjoint and node disjoint. Link disjoint set of paths between a pair of nodes have no common links, whereas node-disjointness additionally precludes common intermediate nodes. Fig. shows. Paths maintained at different nodes to a destination may not be mutually disjoint. Here D is the destination. Node A has two disjoint paths to D: A – B – D and A – C – D. Similarly, node E has two disjoint paths to D: E – C –

D and E – F – D. But the paths A – C – D and E – C – D are not disjoint; they share a common link C – D.



(a) (b)

Fig. shows next hop information is insufficient to guarantee link disjointness. Here D is the destination. Node A has a path via I to D (A – I – D). Similarly, node B also has a path via I to D (B – I – D). Node P knowing only the next hops A and B cannot determine whether paths from A and B to D (A – I – D and B – I – D, respectively) are link disjoint. So if P forms paths via A and B then the resulting set of paths from P are not link disjoint even though the next hops (A and B) are distinct.

Fig. shows Idea behind link disjoints path computation. (a) The two paths shown from P to D satisfy the differing next and last hop condition. But they are not link disjoint. However, note that the intermediate node I does not satisfy the condition. If all nodes on every path satisfy the condition, then the paths will be link disjoint. In that case, only one path is possible (see Subpart (b)). However, in subpart (c) two link disjoint paths are possible.

III. CONCLUSION

In our paper , we have proposed a day-to-day traffic assignment model that considers the effects of differences between the estimated travel cost and the expected cost. The stability of this model and its dynamic evolution were analyzed. Compared to the case with static rerouting behavior, the most important improvement is the dynamic change in rerouting weight. The properties of the rerouting weight are derived from survey data. Both theoretical analyses and numerical simulations using the two networks demonstrated the following:

(1) Dynamic rerouting behavior enlarges the stable equilibrium region and decreases the parameter sensitivity of the model.

(2) Dynamic rerouting behaviour improves the convergence speed and decreases the cost and flow oscillations. This can be explained as follows. In the case with static rerouting behaviour, a constant proportion of travellers formulate rerouting decisions each day, causing oscillations in flow and cost. In the case with dynamic rerouting behaviour, the rerouting weight decreases dynamically with time, leading to a decrease in the proportion of travellers changing their routes. Subsequently, the cost difference decreases rapidly, causing the flow and cost to exhibit small fluctuations. This dynamical process repeats, thereby improving the convergence speed and decreasing the amplitude of the cost difference dynamic traffic simulation models that aim to simulate an evacuation simulate this reactive traveller behaviour, therewith incorporating the important role of time-varying disaster conditions, (traffic) information, and warnings, discretionary advice and evacuation orders. From this viewpoint, the different model formulations to simulate travel behaviour were elaborated on, as well as their suitability to the case of evacuation. For the evacuation participation and departure time choice we argued in favour of the simultaneous approach to dynamic evacuation demand prediction using the repeated binary logit model. The repeated binary logit model provides insight into trade-offs made in the decision to evacuate, resulting in dynamic travel demands that on an aggregated level are more or less consistent with the observed choices.

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