An Introduction to DTN

YANG　Wenjing , ZY1321222, 20130923, BUAA

In this paper, I would like to introduce Delay\Disruption tolerate networking (DTN)[1, 2], the field I am engaged in. As the name implies, DTN focuses on the networking problems in scenarios where frequent disruption and long delay will occur.

At the beginning, DTN is a specific solution for Interplanetary Internet(IPN). As Data transmitting between planets leads to long delay, the DTN was introduced to solve disruption problems caused by the vehicles’ mobility on land. In 2003, Kevin Fall[3] .etc. proposed this conception in an international conference SIGCOMM for the first time. Currently, the leading research groups including Defense Advanced Research Projects Agency (DARPA), Internet Research Task Force (IRTF) and National Aeronautics and Space Administration (NASA) have been conducting researches on DTN architecture, algorithms and protocols. Part of those results have been applied to IPN[3], Military Ad-hoc Networks[4], Sensor/Actuator Networks[5], Pocket switched networks[6] .etc.

Despite of the network environmental difference, DTN chooses a new approach, “Store-carry-forward”, to accommodate a shoddy network condition. “Store-carry-forward” approach is robust compared with traditional “store-forward” method. By mobility and contacts between nodes, messages can be relayed from one nodes to another, and finally to the destination.

A typical DTN scenario would be described as follows: In a poor village, people cannot afford to pay for the Internet. Students use computers in school to send emails. Those messages cannot be sent until a postman with special device called mule passed by and received. When the postman can communicate with a base station connecting to the internet, data transmitted successfully. In this case, computers in school, postmen’ device and base station are considered as nodes. An famous Implementation is DakNet[7] in India developed by MIT.

The further study on DTN can be divided into four parts:

1. Architecture. At present, Bundle is mostly used, which is based on TCP/IP architecture. Problems like security, scalability haven’t been definitely settled.
2. Modeling on mobility and topology. Models which can describe the real world to generate trace of nodes or predict the contact probability are in demand. It’s a hot topic in DTN studies.
3. Routing algorithms and protocols. To apply the achievement above, algorithms and protocols are designed which can improve scalability, security or decrease transmission delay.
4. Evaluation. No acknowledged rules and method to assess a routing algorithm/protocol/model. Existing means is that comparing their own method with other design. It’s quite subjective because there are many factors affect the experiment results.

As a new networking approach, DTN is a hot field in computer science and worth of more attention.

**参考文献**

[1] Fall K. A Delay-Tolerant Network Architecture for Challenged Internets: Computer Communication Review, Karlsruhe, Germany, 2003[C].

[2] Fall K, Farrell S. DTN: an architectural retrospective[J]. Selected Areas in Communications, IEEE Journal on, 2008,26(5):828-836.

[3] Fall K. A Delay-Tolerant Network Architecture for Challenged Internets: SIGCOMM'03, Karlsruhe, Germany, 2003[C].

[4] Burbank J L, Chimento P F, Haberman B K, et al. Key Challenges of Military Tactical Networking and the Elusive Promise of MANET Technology [J]. Communications Magazine, IEEE, 2006,44(11):39-45.

[5] Juang P, Oki H, Wang Y, et al. Energy-efficient computing for wildlife tracking: design tradeoffs and early experiences with ZebraNet[J]. SIGARCH Comput. Archit. News, 2002,36(5):96-107.

[6] Hui P, Chaintreau A, Scott J, et al. Pocket switched networks and human mobility in conference environments: WDTN '05, New York, NY, USA, 2005[C]. ACM.

[7] Pentland A, Fletcher R, Hasson A. DakNet: rethinking connectivity in developing nations[J]. Computer, 2004,37(1):78-83.