

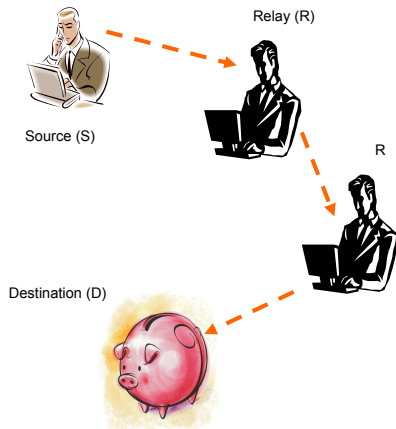
Cooperation with Untrusted Relays

Xiang He, Aylin Yener

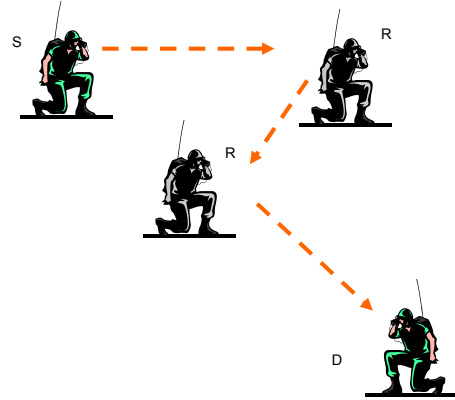
Q1: What is “Untrusted Relay”?

Ex1: In online banking, should other nodes (users) help reach the access point?

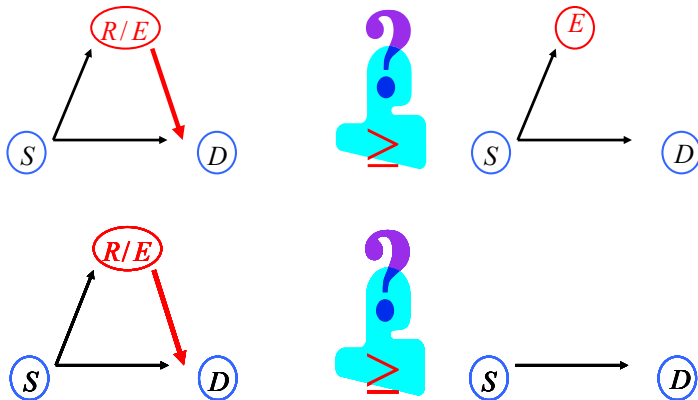
Ex2: Troops separated by nodes with different levels of clearance: Should these relays be employed?



A communication network is usually composed of nodes with **different security clearances**. Are those nodes with LOW security clearance useful in transmitting sensitive information?



Q2: Can an untrusted relay be useful?



The link between the untrusted relay and the destination can increase the secrecy rate.

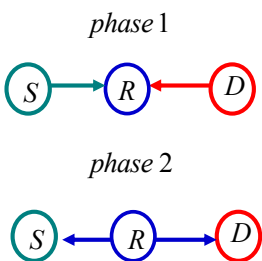
Xiang He and Aylin Yener, [On the Equivocation Region of Relay Channels with Orthogonal Components](#), the 41st Annual Asilomar Conference on Signals, Systems, and Computers, 2007.

When link noises are reversely correlated, an untrusted relay should be deployed to increase the secrecy rate.

Xiang He and Aylin Yener, [The Role of an Untrusted Relay in Secret Communication](#), in Proceedings of the IEEE International Symposium on Information Theory, ISIT'08, Toronto, Canada, July 2008.

Result: An untrusted Relay is much better than an eavesdropper.

Q3: no direct link between source and destination?



Phase 1: “D” jams the untrusted relay “R” while node “S” transmits.
Phase 2: “R” relays the signal it received during phase 1 to node “D”.

Result: Secret Rate >0 is possible

Results can be extended to the case with more than 2 hops.

Xiang He and Aylin Yener, Two-hop Secure Communication Using an Untrusted Relay: A Case for Cooperative Jamming, IEEE Globecom, New Orleans, LA, December 2008

Xiang He and Aylin Yener, End-to-end Secure **Multi-hop** Communication with Untrusted Relays is Possible, to appear in Asilomar'08, Pacific Grove, CA, November 2008.

Xiang He and Aylin Yener, The Role of Feedback in Two-way Secure Communication, to appear in Asilomar'08, Pacific Grove, CA, November 2008.