Managing Credits
in Mobile Ad Hoc Networks

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Scenario

Mobile Ad Hoc Networks (MANETs):
are kept connected by the mobile hosts
may be not governed by a single authority

MANETs need:

Cooperative behaviour,
e.g., forwarding each other’s packets

⇒ A node may misbehave by agreeing
to forward packets and then failing to do so

• overloaded
• malicious
• broken
• selfish
Related Work

Reputation systems & award-based systems

may be used to provide incentives to forward packets.


Nuglet is a virtual currency (Buttyan & Hubaix 2002).

⇒ pay when sending packets
   being paid when forwarding packets
Local Management of Credits & Debits

Each node locally maintains a Credit Table

⇒ With $S =$ packet source
  Credits = packs that $S$ has forwarded for $A$
  Debits = packs that $A$ has forwarded for $S$

Authenticated proof of delivery. Cryptographic extension at routing level included as additional data in DSR-like specifications.

Credits cannot be spent over all available routes
⇒ Credit transferring
  $A =$ first-hand debtor of $S$
  $B =$ second-hand debtor of $S$
  ⇒ $A$ securely transfers debits to $B$
Identity Management

Nodes may re-enter the network in disguise:
• *misbehaving users are punished*
• *new users are granted to have an initial amount of packets forwarded*

Source of inspiration ⇒
out-of-band mechanisms to bootstrap authentication in wireless networks

*The Resurrecting Duckling – Stayano & Anderson*

*Location-Limited Channels – Balfanz et al.*

First: “achievement of a credential in a non forgeable way” – univocal device identification

Then: At any time, devices do not possess more than one valid certificate
What’s different from...

?? Neighborhood monitoring
?? Virtual currency
?? Central authority awarding & charging nodes
(free in multi-hop cellular networks)

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“Trusted e-services for dynamic coalitions”