

## SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING  
COLLEGE OF DESIGN AND ENGINEERING  
Website: <https://cde.nus.edu.sg/ece>

**Area: Communications and Networks (CN)**

**Host: Prof Biplab Sikdar**

<b>TOPIC</b>	:	<b>Direct-to-cell Low Earth Orbit Satellite Networks and Location Privacy</b>
<b>SPEAKER</b>	:	<b>Mr Shi Quan Graduate Student, ECE Dept, NUS</b>
<b>DATE</b>	:	<b>Wednesday, 3 June 2026</b>
<b>TIME</b>	:	<b>10:00AM-10:30AM</b>
<b>VENUE</b>	:	<b>Join Zoom Meeting <a href="https://nus-sg.zoom.us/j/86051772169?pwd=TgEaVfzRdG0AQP4vEChx70g8mlfc5L.1">https://nus-sg.zoom.us/j/86051772169?pwd=TgEaVfzRdG0AQP4vEChx70g8mlfc5L.1</a> Meeting ID: 860 5177 2169 Passcode: 405318</b>

### ABSTRACT

In direct-to-cell Low Earth Orbit satellite networks, ordinary mobile phones can connect to satellites when terrestrial cellular infrastructure is unavailable or insufficient. This service is usually operated by two different parties: a Mobile Network Operator, which manages user identity, subscription, and billing, and a Satellite Network Operator, which provides satellite coverage and connectivity. This multi-operator setting creates a privacy problem. The satellite operator naturally observes where a phone is served, while the mobile operator knows who the subscriber is. If service records, billing data, or network identifiers are handled in a straightforward way, the two sides may expose or reconstruct the link between a user's identity and location trajectory. We propose a protocol-layer framework that separates service authorization from fine-grained location tracking. Instead of requiring every satellite access request to be checked online by the mobile operator, our system allows the phone and satellite to use anonymous, pre-authorized tokens. The satellite can verify that a user is entitled to service without learning the user's long-term identity, which also reduces attachment delay and avoids excessive signaling over dynamic satellite links. Our system further gives users configurable control over location disclosure. A user may prove being inside a required geographic region without revealing exact coordinates, allowing different levels of precision for roaming, regulation, emergency service, or billing needs. To support commercial operation, our system also introduces anonymous session management and aggregate settlement. The satellite operator can prove that it provided legitimate service, and the mobile operator can verify usage for billing, without exposing unnecessary per-user movement records.

### BIOGRAPHY

Mr. Shi Quan is currently pursuing a PhD degree in Prof. Biplab Sikdar's group. His research interests include Security and Privacy Protocols in Cellular Networks and Next-Generation Networks.

<https://cde.nus.edu.sg/ece/highlights/events/>