Gizem Akman, Mohamed Taoufiq Damir, Valtteri Niemi
Department of Computer Science, University of Helsinki
Helsinki Institute for Information Technology (HIIT)

Kuan Eeik Tan, Philip Ginzboorg, Sampo Sovio
Huawei Technologies Finland

Privacy-Aware E-coupons

E-Coupon APP is an application that grants e-coupons for shops to its users when they are in the range of the shopping mall that hosts the shops

E-coupons

- Coupons are an essential part of many digital marketing strategies.
- There is a risk of fraud associated with electronic coupons (e-coupons).
- In the USA, e-coupon crime losses are estimated to cost around 300-600 million dollars annually.
- Hence the interest in developing innovative ways for secure distribution and use of e-coupons.

User receives a notification of a discount for the Shop in the Mall.

User with *E-coupon APP* in their device is near a shopping mall.

User opens the notification.

Security Goals

- Privacy
  - Shop should not learn the customer's identity unless they show it.
  - Server does not learn the identities of the individual customers.
- Unforgeability
  - Only the issuer offers valid e-coupons.
- Transferability
  - E-coupons can be made transferable.

Loyalty Benefits

- The customers earn digital cash/point/coin per their purchases:
  - Reward coins to elevate status for having benefits.
  - Digital coins to buy discounts, exchange for real money, and transfer to another customer.
- Digital coins can be used to buy reward coins to elevate the status.
- Elevated status provides better coupons and discounts.

User goes into the Mall to go to the Shop.

User gets a unique QR code for the discount.

User enters the Shop.

User presents the QR code to the cashier to get the discount.

Goals of the Protocol

- The goal is to give e-coupons as advertisements to those who use the APP.
- The store decides how many and what kind of e-coupons to distribute.
- The issuer sets and manages the lifetime of the e-coupons.
- In the meantime, the issuer does not learn who the customer is.

QR code is deactivated in the APP after the use.