Solutions

1. Messages from ATM to Sever

Msg name	Purpose
HELO sp <userid>	Let server know that there is a card in the ATM machine
	ATM transmits user ID (cardNo.) to Server
PASS sp <passwd>	User enters PIN (password), which is sent to server
BALA	User requests balance
WDRA sp <amount>	User asks to withdraw money
BYE	user all done

1. Messages from Server to ATM

Msg name	Purpose
500 sp AUTH REQUIRE	Ask user for PIN (password)
525 sp OK!	Requested operation (PASSWD, WITHDRAWL) OK
401 sp ERROR!	requested operation (PASSWD, WITHDRAWL) in ERROR
AMNT:<amnt>	Sent in response to BALANCE request
BYE	User done, display welcome screen at ATM

2. Interaction between ATM and Sever:

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Client                          server


HELO <userid>     -------------> (check if valid userid)
                 <------------   500 sp AUTH REQUIRED!


PASS <passwd>     -------------> (check password)
                 <------------   525 OK! (//password is OK)


BALA              -------------> (check balance from database)
                 <------------   AMNT:<amnt>



WDRA <amnt>       -------------> (check if enough $ to cover withdrawal)
                 <------------   525 OK (if enough, update database)
(ATM dispenses)
                 <------------   401 sp ERROR! (else)



BYE               ------------->
                 <------------   BYE
```

Remarks

1. The Protocol only defines Messages and Interactions between ATM and Server. Typically, users need an interface or agent (which will be developed by software engineers and employed on ATM) to interact with ATM.

   Moreover, there should also be a sever program to deal with users accounts and balance with respect to ATM request.

2. In the next mission, the students should make the protocol better to work. The students may refer FTP protocol (RFC959) to get useful clues.

   Besides，the students should code the programs both on ATM and Sever, to train their TCP socket programming skills.

   The programs may be coded with any language that the students are familiar with. But the heterogeneous programs on ATM and Server should interact properly.