Mobile Computing Midterm (103/11)

1. What are three advantages of SIP? (6%) Describe functions of SIP INVITE, REGISTER, REFER, OPTION, INFO, UPDATE methods. (12%) What are the usages of SIP Contact, Record-Route, Via, Allow headers? (10%) (c) What is SIP forking proxy? How does it works (4%) (32%)

2. (a) What is the offer/answer mode for SDP? (2%)
   (b) Explain the meaning of
   "m=audio 45678 RTP/AVP 15 3 0
   a=rtpmap 2 G726-32/8000
   a=rtpmap 4 G723/8000
   a=rtpmap 15 G728/8000" for media information in SDP. (6%)
   (c) Explain the meaning of
   "m=audio 45678 RTP/AVP 2
   a=rtpmap 2 G726-32/8000
   m=audio 45679 RTP/AVP 4
   a=rtpmap 4 G723/8000
   m=audio 45680 RTP/AVP 15
   a=rtpmap 15 G728/8000" (2%)

3. Describe and draw the SIP message flow (含重要的 header) to start a session via redirect server. (14%)

4. (a) List three components of the Global Satellite Positioning System (GPS). (6%) (b) How many orbital planes, satellites per plane does it have? (4%) (c) What purpose of the GPS data protocol is? (2%) (d) Write down the name of the GPS data protocol. (4%) (16% total)

5. What is the geographic information system (GIS)? (6%)

6. Which three methods can enhance the accuracy of GPS Positioning against GPS Errors and Biases? How they work? (name: 2%, functions: first two 6%, the last 4%) (22% total)

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Ans:

(a) A powerful alternative to H.323
(b) More flexible, simpler
(c) Easier to implement
(d) Better suited to the support of intelligent user devices
(e) A part of IETF multimedia data and control architecture (任選三, 6%)

- INVITE (2%)
  ⇨ Initiate a session with information of the calling and called parties and the type of media
- REGISTER (2%)
  ⇨ Log in and register the address with a SIP server
- REFER (2%)
  ⇨ To enable the sender of the request to instruct the receiver to contact a third party
- OPTION (2%)
  ⇨ Query a server as to its capabilities
- INFO (2%)
  ⇨ For transferring information during an ongoing session
- UPDATE (2%)
  ⇨ To enable the modification of session information before a final response to an INVITE is received

- Contact (2%)
  ⇨ Provides a URL for use in future communication regarding a particular session
- Record-Route (2%)
  ⇨ The information contained in the Record-Route: header is used in the subsequent requests related to the same call
- Via (2%)
  ⇨ Record the path taken by a request
- Allow (2%)
  ⇨ Indicate the SIP methods that servers/clients can handle

Forking Proxy: a proxy forks a single request to multiple destinations (2%)

A user is registered at several locations (2%)

branch=xxx

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Ans:

(a) offer/answer mode for SDP: to reach an agreement between the two parties as to the types of media they are willing to share. (2%)

(b) m=audio 45678 RTP/AVP 2 4 15
media type: audio (1%)
Port: 45678 (1%)
Format: RTP/AVP--- list the various types of media format that can be supported (1%) according to the RTP audio/video profile (1%)
a=rtpmap 2 G726-32/8000
a=rtpmap 4 G723/8000
a=rtpmap 15 G728/8000: 只有一個 port 45678，只希望選一個 media type (2%)

(c) a=rtpmap 2 G726-32/8000
a=rtpmap 4 G723/8000
a=rtpmap 15 G728/8000:有三個 port 45678, 45679, 45680，可以同時選三個 media type (2%)

3. Describe and draw the SIP message flow (含重要的 header) to start a session via redirect server. (14%)

Ans:

Redirect Server:
INVITE (contact, Call-ID, CSeq), **302 moved temp** (contact, Call-ID, CSeq), **ACK** (Call-ID, CSeq), **re-INVITE** (Call-ID, CSeq)

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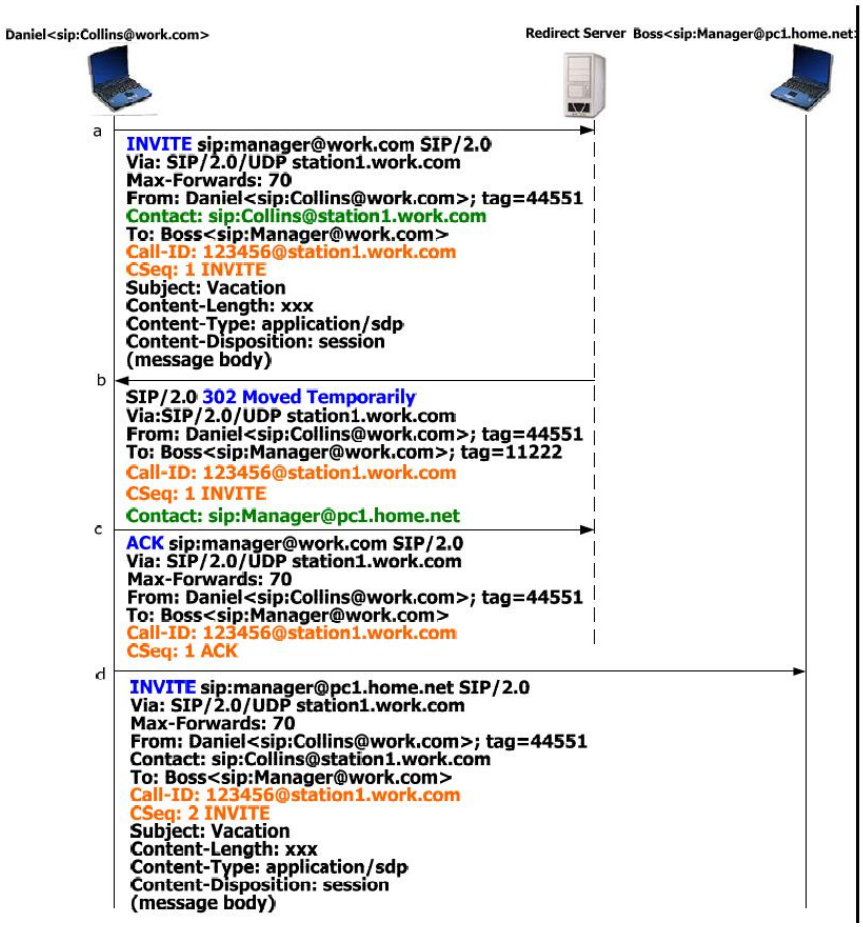

4. (a) List three components of the Global Satellite Positioning System (GPS). (6%) (b) How many orbital planes, satellites per plane does it have? (4%) (c) What purpose of the GPS data protocol is? (2%) (d) Write down the name of the GPS data protocol. (4%) (16% total)

Ans:

(a) GPS Satellite broadcast its own-specific signal for each satellite (6%)

- GPS receiver **passively** receives these signal from the sky
- GPS ground stations control and adjust the satellite orbits

(b) 6 Orbital Planes with 4 Satellites per plane (4%)

(c) To combine data from different GPS receiver manufactured by different GPS manufacturers (2%)

(d) NMEA 0183 (4%)

5. What is the geographic information system (GIS)? (6%)

Ans:

A **geographic information system (GIS)** is a system for capturing, storing, analyzing and managing data and associated attributes 或 GIS is a computer system (2%) which is capable of integrating, storing, editing, analyzing, sharing, and displaying (2%) geographically-referenced information (2%) (6%)

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6. Which three methods can enhance the accuracy of GPS Positioning against GPS Errors and Biases? How they work? (name: 2%, functions: first two 6%, the last 4%) (22% total)

Ans:

(a) DGPS – Differential GPS (2%)

- It uses a network of fixed ground based reference stations to broadcast the difference information (2%)
- Between the positions indicated by the satellite systems and the known fixed positions (or between the measured satellite pseudoranges and actual (internally computed) pseudoranges) (2%)
- Receiver stations may correct their pseudoranges by the same amount (2%)

(b) WAAS – Wide Area Augmentation System (2%)

- It is achieved via a network of ground stations which measure the GPS signal and route the measurements to two master stations (2%)
- They generate and send the correction messages to geostationary satellites which broadcast the correction messages back to Earth (2%)
- WAAS-enabled GPS receivers will apply the corrections to their computed GPS position (2%)

(c) AGPS – Assisted-GPS (2%)

- Mobile telephones with embedded GPS engines, (2%)利用 base station 的信號，配合傳統 GPS 衛星信號(2%)，讓定位的速度更快。