2G, 3G Network Planning and Optimization...

Archives

▼ 2009 (56)
► Октябрь (15)
▼ Сентябрь (41)
3.8 Network Capacity Comparison For the comparis...
3.7 Multiple Reuse Pattern Technology3.7.1 Basic...
3.6 Concentric Cell Technology 3.6.1 Concept I...
3.5 Aggressive Frequency Reuse Technology 3.5.1 ...
3.4 Normal Frequency Reuse Technology 3.4.1 C...
3.3 Frequency Planning Principle Generally, when ...
3.2 Frequency Division and C/I Requirement 3.2.1 ...
3 GSM Frequency Planning 3.1 Overview Frequency ...
2.13 Conclusion Network planning is the foundatio...
2.12 Repeater Planning 2.12.1 Application Backg...
2.11 Tunnel Coverage 2.11.1 Characteristic of T...
2.10 Design of Indoor Coverage System2.10.1 Ch...
2.9 Dual-Band Network Design 2.9.1 Necessity for...
2.8 Location Area Design 2.8.1 Definition of Loc...
2.7 Design of Base Station Address 2.7.1 Address d...
2.6 Base Station Number Decision After traffic an...
2.5 Traffic Analysis 2.5.1 Traffic Prediction an...
2.4 Network Structure Analysis When considering t...
2.3 Coverage Analysis 2.3.1 Area Division I. Typ...
2.2 Planning Foundation 2.2.1 Coverage and Capacit...
2 GSM Radio Network Planning 2.1 Overview The de...
1.17 CBS Cell Broadcast Service (CBS) is similar ...
1.16 Call Re-Establishment 1.16.1 Introduction ...
1.15 HOAs a key technology in the cellular mobil...
1.14 MS Originated Call Flow 1.14.1 Enquiry Afte...
1.13 MS Originating Call Flow The MS needs to set ...
1.12 Location Update In GSM, the paging informati...
1.11 Authentication and Encryption GSM takes lots...
1.10 Immediate Assignment Procedure The purpose o...
1.9 Power Control 1.9.1 Power Control Overview P...
1.8 Discontinuous Reception and Discontinuous Tra...
1.7 Frequency Hopping With the ever growing traff...
1.6 Cell Selection and Re-Selection 1.6.1 Cell S...
1.5 System Information System information is sent ...
1.4 Timing advance Signal transmission has a dela...
1.3 Data Transmission Radio channel has totally d...
1.2 Multiple Access Technology and Logical Channel...
1 GSM Principles and Call Flow 1.1 GSM Frequency ...
Radio Network Planning Optimization The objective ...
History of GSM 1 GSM Development Mobile telecommun...

среда, 2 сентября 2009 г.

1.15 HO

As a key technology in the cellular mobile telecommunication system, handover (HO) can reduce the call drop rate and the network cross interference. The handover procedure consists of handover trigger, handover preparation and decision, and handover execution.
HO can be divided into synchronous HO and asynchronous HO based on Timing Advance (TA). Synchronous HO means the two cells are synchronized with each other and the MS can calculate the new TA (the HO command indicates whether the HO is synchronous or not). Asynchronous HO requires the BTS to calculate the new TA. When the MS receives the HO command and requests for the new BTS access, the new BTS informs the MS of the calculated TA. The MS access to the new channel can also be divided into four types: synchronous, asynchronous, pre-synchronous, and pseudo-synchronous. The first three types are required in MS and the last one is optional. The pseudo-synchronous HO can be performed only when the MS supports this function. In the pseudo-synchronous HO, the handover command from the BTS of the original service cell contains the RTD value (the TA difference between the source BTS and the target BTS). The MSC calculates the TA required for the access to the new BTS based on the RTD value.
The HO process involves MS, BTS, BSC, and MSC. According to the location where the HO happens, the HO can be divided into intra-cell HO and inter-cell HO. To be more specific, intra-cell HO, intra-BTS HO, intro-BSC HO, intra-MSC HO, and inter-MSC HO. The function of each unit is: MS measures the downlink performance and the signal strength; BTS monitors the received signal level and quality of the uplink and the interference level of the idle traffic channel; BSC handles the measurement report and makes the HO decision; MSC decides the target cell of the inter-BSC HO.

1.15.1 HO Preparation

I. Measurement Report
The HO decision depends on the measurement report (MR) sent by MS through uplink SACCH to the network and the MR of the uplink sent by BTS. These two reports are sent to BSC at the same time for decision. The system information that includes the parameters of the current cell and the neighbor cell are sent to the MS under the dedicated mode through the downlink SACCH. The MS reports the RXLEV and quality, TA value, power control, and DTX usage to the network according to the system information. In addition, the MS also performs the pseudo-synchronization with the neighbor cell defined by the system for HO and measures the RXLEV from the BCCH. The MS measures all the frames except the idle frames that are used to synchronize the neighbor cell and decode SCH. The MS reports the condition of the cell and the six neighbor cells with the strongest RXLEV it measures during the measurement period to the system for the HO decision.
Measurement period
The SACCH measurement period is different if the MS occupies different channel under the dedicated mode.
–If the SACCH is associated with SDCCH, the measurement period is 470ms, because a complete SACCH message block occupies two 51 multiframes of SDCCH.
–If the SACCH is associated with TCH, the measurement period is 480 ms, because a complete SACCH message block occupies four 26 multiframes of TCH.
A complete MR consists of four continuous SACCH bursts. On the SDCCH, the four bursts are transmitted continuously. On the TCH, each 26 multiframe has only one SACCH burst, so a complete MR requires four 26 multiframes.
Figure 1-1 Measurement period
Whether to use DTX or not, the MR has two values: full measurement value and sub measurement value. For details, see the DTX description in Chapter 2.
MR processing
BTS handles the uplink MR it makes and the downlink MR it collects from the MS. It obtains the sample values of the RXLEV, RXQUAL, and TA, and then calculates the arithmetical mean value and the weighted mean value based on the related parameters. When the time is up, the system decides whether to perform the level handover, quality handover, or distance handover.
II. Neighbor Cell Monitoring
To establish the HO relation with the neighbor cells, the MS must listen to the standard frequency of the neighbor cells defined in the system message. The standard frequency carries the synchronous channel and frequency correction channel. One way to decide the received channel is the standard frequency channel is to confirm that the frequency carries a FCCH. The MS also decodes the SCH that carries the TDMA frame number and BSIC. The MS can only analyze the BCCH standard frequency of the neighbor cell in the idle timeslot of the TCH multiframe. In fact, during the data exchange, the interval between the end of the reception and the beginning of the transmission (about 1 ms) can be used to measure the RXLEV and the RXQUAL, but it is not sufficient to measure the level of the neighbor cell. The interval between the end of the transmission and the beginning of the reception (about 2 ms) is sufficient to measure the level of the neighbor cell, but not sufficient to find the FCCH. In the 26 muliframe of TCH, there is always an idle frame (about 6 ms) available for MS to decode the FCCH and SCH. But the FCCH of the neighbor cell may not be found during this timeslot. Therefore, the use of the arithmetic feature of the two numbers 26 and 51 is required. Because these two numbers have no common factor, the FCCH can be found during the 11 periods. When SACCH is associated with SDCCH, although its period is also 51 multiframe, the SDCCH channel assigned to the MS only occupies 1/8 of the 51 multiframe. Since there are lots of idle timeslots, the MS can synchronize the neighbor cell.
When the MS receives the SCH, the synchronization is established. To translate the message on the downlink CSCH, the MS must know the training sequence of the CSCH. The training sequence is of eight types, matching the BCC 0 to BCC 7 of BSIC respectively. The BSIC carried by the SCH can

inform the MS of the training sequence number of its service cell.
BSIC also enables the MS to differentiate the cells using the same BCCH frequency. The two cells with the same BCCH frequency and BSIC must be far from each other. The MS reports the six neighbor cells with the strongest signals, but differentiates them according to the BSIC and frequency it obtains to achieve the pre-synchronization. The MR only contains the sequence number of the frequencies in the BA list. Therefore, if a cell shares the same frequency and BSIC with the neighbor cell and its signal is strong enough, error report and decision of MS may occur, leading to HO failure and call drop.
III. Conditions Required for Neighbor Cells to Join in HO Decision Queue
When the BTS receives the report on the neighbor cell from the MS, it checks whether this neighbor cell is qualified to join in the HO decision queue. The following conditions must be met:
RXLEV(n) > RxLevMinCell(n)+ MAX(0,Pa(n)) + OFFSET (2-4)
Pa(n)=MS_TXPWR_MAX(n) －MAX_POWER_OF_MS
RXLEV(n) is the RXLEV of the neighbor cell; RxLevMinCell(N) is the minimal access level of the neighbor cell; OFFSET is the offset of the minimal access level; MS_TXPWR_MAX(n) is the maximal transmit power of MS defined by the system; MAX_POWER_OF_MS is the maximal transmit power the MS can achieve. The unit is dBm.
RxLevMinCell(n) and MS_TXPWR_MAX(n) are defined by the HO cell parameters. Under the dedicated mode, the system informs the MS by sending the system message through SACCH. The neighbor cell can be listed in the HO candidate cells only when its RXLEV is qualified according to the formula above. The defined RxLevMinCell (n) must be higher than the RXLEV_ACCESS_MIN. If it is too low, the threshold for the candidate cells is reduced, which may lead to HO failure. The purpose to define the Pa is to ensure the low power MS can access the neighbor cell only when the RXLEV is high enough, thus improving the quality of conversation.

1.15.2 HO Types

HO must be performed on time under different conditions to ensure the quality of communication. According to the cause of the HO, it can be divided into Power Budget (PBGT) HO, edge HO, bad quality (BQ) HO, direct retry, and timing advance (TA) HO.
I. PBGT HO
PBGT HO is based on path loss. PBGT HO algorithm looks for a cell with less path loss to decide whether HO is necessary. The biggest difference between the PBGT HO and others is that the triggering condition is path loss but not receiving power.
The formula of PBGT HO is as follows:
PBGT (n) > PGBT_Ho_Margin (n) (2-5)
PBGT(n) = (BSTX_MAX - RXLEV_DL - PWR_C_D) - (BSTX_MAX(n)- RXLEV_NCELL(n))- (RXLEV_DL - RXLEV_UL - SENSI_CORRECT)- max (BSTX_MAX(n)- min(MSTX_MAX(n),P) - BSTX_MAX + min (MSTX_MAX,P) ,0)
BSTX_MAX: The maximum transmit power of BS in service cell
BSTX_MAX (n): The maximum transmit power of BS in neighbor cell
RXLEV_DL: The downlink received signal level in service cell
RXLEV_UL: The uplink received signal level in service cell
SENSI_CORRECT: The correct factor of MS/BS receiver sensitivity
RXLEV_NCELL (n): the received signal level of MS from neighbor cell n
PWR_C_D: the decrease of the transmission power in BTS power control
P: Max MS Transmission power
MSTX_MAX (n): Max MS transmit power allowed of the neighboring cell n
MSTX_MAX: Max MS transmit power allowed of the service cell
The neighbor cell with the biggest PBGT (n) is selected as the target cell for HO. The PGBT_Ho_Margin is the defined RXLEV difference value between the service cell and the neighbor cell when the HO is initiated. If this value is too low, it may lead to ping-pong handover; if it is too high, HO hysteresis may occur and the HO efficiency is reduced. Since the PGBT_Ho_Margin is defined for the specific neighbor cell, the traffic load can be adjusted accordingly. For example, when cell A and cell B are adjacent, A is the high-traffic cell and B is the low-traffic cell, the call distribution can be balanced by reducing the PGBT_Ho_Margin from A to B and increasing that from B to A. In fact, this way to balance the call distribution equals the decrease of the coverage area for cell A and the increase of the coverage area for cell B.
PBGT HO only happens between the peer cells. .
II. Edge HO
The uplink/downlink edge HO margin is defined in the HO parameters. When BSC finds in the MRs from the MS and BTS that the uplink or downlink RXLEV is lower than the edge HO margin defined, it selects a proper neighbor cell from the MRs as the target cell to initiate HO, thus avoiding the call drop. In the edge HO, the RXLEV of the neighbor cell should be higher than that of the service cell by a certain value. This value is called the edge HO margin. This algorithm is also used to avoid ping-pong handover. The edge HO margin should be higher than the minimal access level of the MS.
III. BQ HO
The decision mechanism of BQ HO is similar to that of the edge HO. When BSC finds in the MRs from the MS and BTS that the bit error rate of the uplink or downlink is higher than the BQ HO margin defined, the BQ HO is initiated. To further differentiate the BQ HO, the interference HO is introduced. If the RXLEV is higher than the defined RXLEV margin of the interference HO and the RXQUAL is higher than the quality HO margin, the frequency interference exists. The interference HO will trigger the intra-cell HO (when the intra-cell HO is available) first to improve the bad conversation quality due to interference, and then trigger the inter-cell HO. The intra-cell HO is not effective when the frequency hopping is used. By improving the interference HO margin, the BQ HO will be mainly performed between cells.
IV. Direct Retry
During the call establishment, the SDCCH is assigned first and then is the TCH. If the service cell has no idle TCH, the call attempt usually fails because of TCH congestion. To fully utilize the radio resources and reduce the congestion, the direct retry function is introduced. When the SDCCH is assigned, but no TCH is available, the assignment request is sent in the form of MR and the call is accessed to the idle speech channel. After the direct retry function is enabled, the queuing function can be activated to provide enough time for the system to select the neighbor cell available for direct retry.
V. TA HO
TA HO can be used to control the coverage area of the BTS. When the BSC finds the TA value reported by the MS is higher than the defined margin, the TA HO is initiated. If the TA margin is relatively low, the frequent ping-pong handover may be triggered. Therefore, special attention should be paid to the matching of different kinds of HO.

1.15.3 HO Process Analysis

I. Intra-Cell HO

In the real network, sometimes the interference may occur to certain frequency or a certain TRX fails, leading to the high RXLEV but low RXQUAL or the remarkably low signal level of TRX. To improve the conversation quality and avoid the call drop, the intra-cell HO is used.

The intra-cell HO is initiated by the RXLEV margin or RXQUAL quality. During the conversation, BSC analyzes the MR from the MS and BTS. If the requirement for intra-cell HO margin is satisfied, it sends a CHANNEL ACTIVE message to BTS to initiate the intra-cell HO. The connection process is similar to the TCH assignment during the call establishment. Because the TCH is also assigned within the cell, the BTS can indicate the MS to perform the intra-cell HO through HO command or assignment command. When the BSC receives the ASSIGNMENT COMPLETE/HANDOVER COMPLETE message from the BTS, it sends MSC the HO PERFOMED message that contains the HO type. Then the BSC sends a RF CHANNEL RELEASE message to BTS. After receiving the message, the BTS releases the TCH resource and sends a RF CHANNEL RELEASE ACK message back.

When the intra-cell HO is enabled, intra-cell HO increases a lot, and the system load also increases. Therefore, if the traffic load is already heavy, the intra-cell HO function is not recommended.

II. Intra-BSC HO

Intra-BSC HO is performed by BSC and no MSC has to be involved. To inform MSC that the HO is complete, BSC will send a HO PERFOMED message to MSC.

1) The MS sends MR to BTS1 on SACCH at Um interface, and BTS1 forwards the message to the BSC.

2) BSC receives the MR. If it decides that the MS should be handed over to another cell, it sends Channel Activation to BTS2 of the target cell to activate the channel.

3) BTS2 receives the CHANNEL ACTIVATE. If the channel type is correct, it turns on the power amplifier on the specified channel to receive information in the uplink direction, and send CHANNEL ACTIVATE ACK to the BSC.

4) After receiving the CHANNEL ACTIVATE ACK from BTS2, the BSC sends HANDOVER COMMAND to the MS through BTS1 and starts T3103. The handover command contains all the feature information of the transmission on the new channel and the data required for MS access. It also indicates whether this HO is synchronous or asynchronous.

5) After receiving the HANDOVER COMMAND, the MS decides the type of it. If it is synchronous HO, the MS sends the target cell four continuous HANDOVER ACCESS messages on the assigned TCH, and then starts the transmission based on the calculated. For the synchronous HO, the former TA can be used; for pre-synchronous HO, the TA in the handover command is used (If the TA is not provided in the handover command, the default value is used); for pseudo-synchronous HO (MS reported whether this HO is supported or not before), the TA is calculated based on the difference value provided in the handover command. Please note that the HANDOVER ACCESS is send by the access burst. It is the only time when the access burst is used on the DCH. It only contains the 8-bit HO reference number obtained from the handover command. Since this reference number is known to the target cell, the target cell can check whether the access request is from the expected MS with this number.

The HO reference number is not fully defined in the protocol. During the HO access, if the assigned TCH is on the BCCH, due to synchronization error and delay or other reasons, the access burst may offset to the BCCH RACH timeslot. If the 8-bit reference number is the same as a service application number, the system will regard it as a random access by mistake and assign the SDCCH through AGCH, leading to a waste of AGCH and SDCCH. But as the access burst contains the BSIC information, only the HO access cell will be affected.

Since there are more than four HO access bursts, and after the new BSS assigns a channel to the MS, it will no re-assign this channel to other MS, even if no reference number is used, the network can find the MS to access and the HO will not be affected.

To further avoid the waste of radio resources, the reference number is assigned a fixed value that is different from the application number for service type in random access.

6) BTS2 receives the HANDOVER ACCESS from the MS, and send HANDOVER DETECT to the BSC notifying that the HANDOVER ACCESS message is received.

7) For asynchronous HO, after the BTS2 channel of the target cell is activated, it waits for the MS access on the assigned DCH (until the T3103 times out). When it detects the handover access from the MS, the BTS2 sends the HO DETECT message to the BSC and the PHYSICAL INFO that contains the calculated TA to the MS. During the PHYSICAL INFO transmission, the network initiates T3105. Before receiving the SABM frame response from the MS, the BTS2 re-enables the T3105 after timeout and resends the PHYSICAL INFO NY1. For asynchronous HO, after receiving the PHYSICAL INFO, the MS sends the SABM to the BTS2; for synchronous HO, the MS sends the SABM to the BTS2 immediately after sending the HANDOVER ACCESS.

8) For asynchronous HO, the MS starts the T3124 when sending the HANDOVER ACCESS message for the first time and stops the T3124 after receiving the PHYSICAL INFO. For details, see the parameter description section.

9) After receiving the first SABM, BTS2 sends BSC the EST IND to inform it of the radio link establishment. When the network receives this message, it sends an ESTABLISHE INDICATION message to the BSC to show that the data link layer is established. Meanwhile, it also sends the UA response frame to the MS. after receiving the UA response, the MS regards that the signaling answer mode is established with this cell.

10) The MS sends HANDOVER COMPLETE to the BTS2, and BTS2 forwards it to the BSC. Then it sends the target cell a HANDOVER COMPLETE message that only contains the handover complete indication but no other information. The MS stops considering the possibility to return to the former channel only when this message is sent. If the MS does not receive the PHYSICAL INFO from the target cell or the UA response frame, it sends a HANDOVER FAILURE message on the source channel.

11) After receiving the HANDOVER COMPLETE message, the BSC stops the T3103 and sends MSC the HANDOVER PERFORMED that contains the handover type. Meanwhile, the BSC initiates the local release for the former channel of BTS1. When the target cell receives the handover complete message from the MS, it forwards it to the BSC. After receiving this message, the BSC sends the RF CHANNEL RELEASE message to inform the source cell to release the former TCH. When the source cell receives this report, it sends a RF CHANNEL RELEASE ACK to indicate the radio channel is released and available for another assignment.

III. Intra MSC HO

Compared with the intra-BSC HO procedure, the procedure for the inter-BSC HO only has several A interface signaling added.

1) When the MS has to be handed over to the cell where the BSC2 belongs to, the BSC1 sends a HO REQUIRED message that contains cell ID of the target cell group and the source cell and the HO cause to the MSC and starts T7 at the same time.
2) After the MSC receives this message, if it shares the same LAC with the target cell, it searches the BSC of the target cell (BSC2) and sends the BSC2 a HANDOVER REQUEST message that contains the information of the target cell and the source cell, transmission mode, encryption mode, classmark, and the channel type required. When the BSC2 receives this message, it sends MSC a CC message to indicate that the connection between the MSC and its SCCP is established for transmission of the information from the A interface.
3) After the new channel is activated, the BSC2 sends the MSC a HO REQUEST ACK to indicate that the channel is available. This message carries the HO command with the information about the resource allocation in it to show that the local end is ready for HO.
4) After receiving the HO REQUEST ACK, the MSC sends a HO COMMAND to the BSC1. BSC1 stops the T7 and starts the T8, and forwards the HO COMMAND to the MS and starts T3103, informing the MS to access the new channel. This command contains the cell ID, channel type, and HO reference.
5) After receiving the HO COMPLETE from the BSC2, MSC sends a CLEAR COMMAND to the BSC1. This command contains the clear cause (such as HO clear). BSC1 stops T8 and T3103, and releases the former channel. Meanwhile, it sends a CLEAR COMPLETE message to the MSC.

T3103 is started when BSC sends the HO command and cleared when the BSC receives the HO COMPLETE (INTRA BSC) or CLEAR COMMAND (INTER BSC). The T3103 should be set less than T8. During the HO, the BSC provides the time for TCH both in the source cell and the target cell according to the T3103. When the T3103 is timing, two channels are reserved. The longest HO (INTER MSC) may take about five seconds, so the T3103 can be set to five seconds. If it is set too long, the system resources will be wasted.
If the target cell and the source cell are not in the same LA, a location updating will be performed at the end of each call.
IV. Inter-MSC HO
The procedure for inter-MSC HO is shown in Figure 1-26.
1) When MSCa receives the HANDOVER REQUIRED message from the BSC, if it finds that the LAC of the preferred target cell is not in the local LAC list, it queries the remote LAC list that contains the routing address of the neighbor MSC/VLR.
2) When the target MSCb is found, the MSCa sends a PREPARE HANDOVER message that contains the HANDOVER REQUEST to it.
3) After receiving the PREPARE HANDOVER message, the MSCb sends the VLRb an ALLOCATE_HO_NUMBER message to request for HO number (HON) assignment. The HON indicates the routing between MSCa and MSCb.
4) VLRb selects an idle HON and sends it to MSCb through the SEND HO REPORT message.
5) MSCb establishes a SCCP link to the target BSC and sends a HANDOVER REQUEST message to BSCB. Then the BSC activates the channel of the target cell. After receiving the channel activation response from the target cell, the BSC sends MSCb a HANDOVER REQUEST ACK message that contains the HO command.
6) After receiving this message, MSCb sends a PREPARE HANDOVER ACK message that contains the HANDOVER REQUEST ACK and the HON to the MSCa.
7) MSCa receives this message and sends an IAM to MSCb. The IAM contains the HON assigned by VLRb for MSCb to identify which speech channel is reserved for the MS. MSCb sends a SEND HO REPORT RESP message to the VLRb anytime after it receives the IAM.
8) After MSCa receives the ACM from the MSCb, it sends the HO command to the MS. Then the MS will perform the HO access to the target cell.
9) After receiving the HO access message from the MS, MSCb sends MSCa a PROCESS ACCESS SIGNALLING message to indicate that the HO is detected.
10) When the target cell receives the HANDOVER COMPLETE message from the MS, it informs the MSCb. Then the MSCb sends a SEND END SIGNAL REQ message to MSCa to inform it the HO is complete. After the HOIDETECT or HO-COMPLETE is received, the connection between MSCa and MSCb is established. MSCb will release the HON.
11) When MSCa receives the HO complete message, it sends a clear command to the former BSC to release the channel resource. The inter-MSC HO is complete. To avoid the PSTN/ISDN contradiction of the MSCa and MSCb, MSCb must send an answer signaling when receiving the HOIDETECT/COMPLETE.
12) MSCa controls the call until it is cleared. When MSCa clears the MS call, it also clears the call control function of MSCa and sends a MAPISENDIENDISIGNAL message to release the MSCb MAP resource.
MSCb sends a HO failure indication to the MSCa if the MSCb cannot identify the target cell, the HO to the target cell is not allowed, the target cell has no radio channel available, or the data error occurs. The MSCa will perform the HO to the secondary cell or terminate the HO.
V. Subsequent Inter-MSC HO
After the MSCb receives the HO request, it checks this target cell belongs to MSCb and performs the inter-MSC HO. After the HO is complete, it informs the MSC.
The subsequent HO is the handover of MSCb to other MSC after an inter-MSC HO is complete. The target MSC can be the former MSCa or the new MSCb'. The circuit switch happens in the MSCa for both situations. After the subsequent HO is complete, the connection between MSCa and MSCb is released. The procedure for the subsequent HO with circuit switch is as follows:
MSCb is handed over back to MSCa

1) MSCb sends MAP PREPARE SUBSEQUENT HANDOVER request to MSCa. This message contains MSCa number, target cell ID, and all the information in HO REQUEST.
2) MSCa is the call control MSC. It can search the idle channel immediately without target HO number routing.
3) After the radio channel is assigned, MSCa sends a MAP PREPARE SUBSEQUENT HANDOVER response back.
4) If the TCH is busy, BSSa sends a QUEUING INDICATION to MSCb (optional). MSC sends MSCb the MAP FORWARD ACCESS SIGNALLING request that contains the subsequent TCH assignment result (HO REQUEST ACK or HO FAILURE). If the radio channel cannot be assigned or the error occurs to the target cell ID, or the target cell ID does not match the target MSC number according to the HO REQUEST, a MAP PREPARE SUBSEQUENT HANDOVER response that contains the HO FAILURE

information in it is sent to the MSCb. MSCb keeps the connection to the MS.
5) If the MSCa is successfully assigned, and the MAP PREPARE SUBSEQUENT HANDOVER response is sent to MSCb. The MSCb requests the handover of the MS to the new cell of the MSCa by sending a HO command.
6) After receiving the HO complete message, MSCa releases the circuit connection to MSCb.
7) MSCa must send a proper MAP message to terminate the MAP procedure for MSCa and MSCb during the basic HO. When MSCb receives the MAP SEND END SIGNAL response message, it releases the BSSb resources.

MSCb is handed over to MSCb'
Note 1: This message can be sent anytime after the IAM is received.

1) MSCb receives the HO request and finds that the target cell does not belong to the MSCb. It sends a PREPARE SUBS HANDOVER to the MSCa. This message contains the MSCb' ID, target cell ID, and all the information in HO REQUEST. MSCa will initiate a basic HO to MSCb'.
2) If the MSC can be found in the MSCa LAC list and remote LAC list (it contains information about other MSC), after the HON is provided by the VLRb' and the MSCb' channel is activated,
3) MSCa sends a MAP PREPARE SUBSEQUENT HANDOVER response message to the MSCb. This message contains the HO REQUEST ACK from the BSSb' and the BSSMAP information that may be special.
4) After receiving this message, MSCb sends the HO command to the MS. After the access succeeds, if the MSCa receives the MAP SEND END SIGNAL REQUEST (it contains the HO COMPLETE information of the BSSb') from the MSCb', the HO is complete and the connection between MSCa and MSCb is released. MSCa also sends the MAP SEND END SIGNAL response to MSCb to end their MAP conversation. MSCb receives this message and releases the radio resources.
5) After the subsequent HO is complete, the MSCb' replaces the MSCb. Any subsequent inter-MSC HO is the same as described above.
The remote LAC list of MSCa must be complete and contain as many MSCs as possible besides the neighbor MSC. For example, if a user in place A calls another user in place B, the MSC in place A must contains all the data of the MSCs and cells within the area between A and B. Otherwise, the HO cannot be performed and the call drops.

1.15.4 Exceptional Situations

The following are some extra exceptional situations on the basis of what has described before.
I. HO Failure Due to CIC Exception
If the CIC allocated in the Handover REQ received by BSC is marked as BLOCK, BSC will respond to MSC with Handover Failure due to "requested terrestrial resource unavailable".
II. HO Failure Due to MS Access Failure
If the BTS cannot decode Handover Access or Handover Completed correctly when a MS accesses the new channel, the HO will fail. The MS returns to the old channel, and responds with a Hanover Failure message.
For the intra-BSC handover, if the BSC has not received the Handover CMP message on the new channel, or Handover Failure message on the old channel at expiry of timer T3103A, it will consider the call as dropped and send a Clear REQ message to the MSC on the old channel. Upon receiving the Clear CMD message from the MSC, the BSC releases the old channel and notifies the target cell to release the new channel. If timer T3103B1 or T3103B2 times out, the target cell will release the new channel.
For the inter-BSC handover, if BSC1 has not received the Handover CMP message at expiry of timer T3103B2, it will send a Clear REQ message to the MSC to release the call. If BSC2 has not received the Handover DET or Handover CMP message, it will send a Clear REQ message to the MSC for the same purpose.
Автор: ourdot на 1:24

0 коммент.:

Отправить комментарий

Подпись комментария: Выбрать профиль...

Отправить комментарий Просмотр