

# **Chapter 5**

## **Least Cost Routing (LCR)**

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## LCR

### FEATURE DESCRIPTION

LCR (Least Cost Routing) is a dialing function that makes outgoing calls select the circuit costing the least amount of money. The cheapest lines will be selected first, and if they are all in use or unavailable due to technical failure, the next cheapest lines of another line group will be selected.

#### DB Setting Procedures

- Numbering Plan DB
- Tenant Option DB
- LCR Code DB
- LCR Special DB
- LCR Class DB
- LCR Time Zone DB
- Time Zone DB
- LCR Route DB
- LCR Modify DB

#### Numbering Plan DB

Choose the Feature Item as LCR (Least Cost Routing)

#### Tenant Option DB

DB Table is used to designate whether the LCR function will be used per Tenant.

#### LCR Code DB

DB Table is used to set up the necessary codes when only parts of the LCR function are to be serviced using the calling party's COS.

#### LCR Special DB

DB Table is needed only when the 'Ext.Cd' field in the LCR CODE DB is selected to be used. The DB Table is applied when a new digit unable to be analyzed by LCR CODE DB is registered, creating a new Route Index while the calling party is analyzing the digit.

#### LCR Class DB

Select LCR Class when only parts of the LCR function are to be serviced using the calling party's COS.

#### LCR Time Zone DB

When LCR function is used, you can designate Group no(0~15) by each tenant in this LCR Time Zone DB. Refer to the Time Band(1~4) in TIME ZONE DB by using this Group number.

#### Time Zone DB

Refer to the Time Band(1~4) by the Group number which was set in the LCR TIME ZONE DB. Select LCR service usage by day (Sunday ~ Saturday, holiday) and LCR time band(00:00 ~ 23:59)

## LCR Route DB

DB is used to decide whether trunk line (seizure) of the 4 time zones designated in "Time Zone DB" will be available. 1 System can have a maximum of 256 (0~255) Route Index tables.

Trunk line routing is possible in eight steps.

## LCR Modify DB

DB Table is used to refer the LCR MODIFY DB according to the LCR Modify Table value designated in "LCR ROUTE DB."

# PROGRAMMING IN MAP

## 1) Setting Numbering plan

A feature item should be given to each code in the system.

Feature items consist of ATC, Station, Trunk, Function, and LCR.

### 1. Selecting Menu in the MAP

**[DataBase DB Management] ⇒ [System DB Management I] ⇒ [Number Plan]**

### 2. Browsing

Press the [Rx] button after entering the Index.

- **Code** : Digit pressed by the user.
- **Feature** : The following is the function that will be selected per digit according to each select specification. For example, configuration is ATC (Attendant Console), station, trunk line, and function code (\*,#), and LCR. "LCR" must be specified .
- **Input Len** : Number of digit to be entered.
- **Anal.Len** : Number of digit able to be analyzed and handled by the system.
- **LCR Len** : The length of Least Cost Route, code for LCR Virtual tone.
- **LCR Virtual Tone** : Decides whether the LCR virtual tone will be used or not.

## 2) Setting the Trunk DB\_

⇒ Refer to 'DTRK3-E1' section of 'Chapter 4 Trunk Features'

## 3) Managing LCR Tenant Option

### 1. Selecting Menu in the MAP

[DataBase DB Management] ⇒ [System DB Management II] ⇒ [Tenant Option DB]

No.	Item	Option	Initial
0	Preselect No.	[0 - 15]	0
1	Preselect Type	Tenant	Tenant
2	Preselect Service	<input type="checkbox"/>	No
3	-	-	-
4	LCR Service	<input checked="" type="checkbox"/>	No
5	LCR Next Route Tone	<input checked="" type="checkbox"/>	No
6	Billing Digit Tx Type	User Digit	User Digit
7	-	-	-
8	-	-	-
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-

Tenant [ 0 ]

Tenant [0 - 63] 0

Successfully received a response.

Update

### 2. Browsing

Enter the Tenant to be called by pressing the [Rx] button.

#### - Preselect No (KOREA ONLY)

Designate the appropriate Index when using the Preselect number registered in "Preselect DB." Value within 0~15 can be entered for Index.

#### - Preselect Type (KOREA ONLY)

If Tenant is selected, Preselect no of Preselect DB menu in "System DB Management II" is used according to whether the Preselect Service is used or not. This pre-select service is provided by tenant. If Port is selected according to the pre-select Type specification method, pre-select no is used after deciding whether the Preselect Service of the user's Port Information will be used or not.

(First of all, refer to the 'Preselect Service no.Index[0]' which is set in the [Port Information(Total)]menu. By the 'Preselect Service no. Index[0]', refer to the 'Index[0]' which is set in the 'Pre-select DB' of 'System DB Management II'.

And then use 'Preselect Service no' of the Index[0].)

#### - Preselect Service (KOREA ONLY)

Can designate whether the Preselect no will be used per Tenant or Each Port .

#### - LCR Service

Can designate whether the LCR service will be used per Tenant. To use LCR, this option must be turned on. If it is not turned on, only normal trunk calls are available, and LCR service is not available.

#### - LCR Next Routing Tone

Decides whether a Tone to alert the user that a more expensive trunk is seized when a higher step

(0~7) of LCR ROUTE DB is used during LCR service will be used. If 1 (Yes) is selected, the Tone Port and Tone Type (System, Trunk, Special tone) from the “LCR Next Route” option of “System DB Management I => Tone Option” menu is selected, and the time toned (20 [basis of 100msec]) from the “LCR Next Routing Tone Time [22] field of” System DB Management I => System Timer” menu, is designated.

- **Bill Digit Tx type**

Designates whether the Call billing printed by the Call Billing printer will be printed in User Digit or the digit transmitted to the called party after digit conversion.

## 4) Managing LCR Code DB\_

DB Table is used to get the ROUTE Index if the digit entered is within the LCR CODE DB in case LCR service is permitted according to the caller's COS.

### 1. Selecting Menu in the MAP

[DataBase DB Management] ⇒ [System DB Management II] ⇒ [LCR CODE DB]

Index	User Digit	Route	Ext. Code	Ext. Len.	Bill Del. Len.	Preselect	Call Type	ANI Option
96	80001	4	<input type="checkbox"/>		2	<input type="checkbox"/>	ISD	Normal
97	800546	2	<input checked="" type="checkbox"/>	9	2	<input type="checkbox"/>	Toll	Normal
98	801	0	<input type="checkbox"/>		2	<input type="checkbox"/>	Local	Normal
99	802	0	<input type="checkbox"/>		2	<input type="checkbox"/>	Local	Normal
100	803	0	<input type="checkbox"/>		2	<input type="checkbox"/>	Local	Normal
101	804	0	<input type="checkbox"/>		2	<input type="checkbox"/>	Local	Normal
102	805	0	<input type="checkbox"/>		2	<input type="checkbox"/>	Local	Normal
103	806	0	<input type="checkbox"/>		2	<input type="checkbox"/>	Local	Normal
104		0	<input type="checkbox"/>			<input type="checkbox"/>		
105		0	<input type="checkbox"/>			<input type="checkbox"/>		
106		0	<input type="checkbox"/>			<input type="checkbox"/>		
107		0	<input type="checkbox"/>			<input type="checkbox"/>		
108		0	<input type="checkbox"/>			<input type="checkbox"/>		
109		0	<input type="checkbox"/>			<input type="checkbox"/>		
110		0	<input type="checkbox"/>			<input type="checkbox"/>		
111		0	<input type="checkbox"/>			<input type="checkbox"/>		

Index Rx | Digit Rx | Digit Inset Tx | Digit Delete Tx | Record Copy Tx | Record Change Tx | Record Delete Tx

Index [0 - 1499] 96

Successfully received a response. Update

### 2. Browsing

Enter the Code Index to be received.

To access using the user digit, press the digit [Rx] button, then enter the code to be accessed.

- **User Digit**

User digit translated by the digit translation DB.

- **Route #**

Route Index value used to find the LCR ROUTE DB routing per trunk line group.

- **Ext.Cd**

LCR SPECIAL DB is used if this option is designated to be used when the digit entered by the user is not analyzable in LCR CODE DB at the present. Outgoing call uses the new ROUTE index value of LCR SPECIAL DB. Route Index of LCR CODE DB is not significant anymore.

- **Ext.Len**

LCR SPECIAL DB is used only when Ext.Cd is selected to be used and stands for the digit analysis length needed to search the LCR SPECIAL DB. The LCR SPECIAL DB is Searched if the digit entered by the user exceeds this length.

- **Bill Del.len**

This field designates the length of the trunk access code. The digit length of call billing data sent to the SDMR Machine on outgoing calls that is recognized as trunk telephone number. For example, when a

long distance outgoing call is attempted by pressing 9(Trunk Access Code)-0546-460-3000(Called No), (9) 05464603000 call billing data is transmitted to the SMDR Machine if the Bill Dlen option is set up as '1'. It can be seen as the digit length used to classify trunk access code and actual called number.

- **Pre.Sel (KOREA ONLY)**

Selects whether the prior selection function will be used. Select if it will be used.

- **Call Type**

Used for outgoing call type for billing information, call restriction by caller COS.

- **ANI Option**

Takes the "Normal" value as default.

### **3. Appending Digit**

Enter the User Digit to be added by pressing the Digit Insert Tx tab. Add the information to be added.

### **4. Deleting Digit**

Enter the User Digit to be deleted by pressing the Digit Delete Tx tab. All the information of User Digit entered is deleted. Caution!!! Extra caution must be paid as great influence is put on the operating system.

### **5. Record copy**

Enter the Source Digit and Destination Digit to copy particular information by pressing the Record Copy Tx tab.

### **6. Modifying record**

Enter the Source Digit and Destination Digit to change particular information by pressing the Record Modify Tx tab.

### **7. Deleting record**

Enter the Source Digit and Destination Digit to delete particular information by pressing the Record Delete Tx tab.

### **8. DB Update**

The screen must be Updated by system after adding, deleting, or changing DB or copying, deleting, or changing a particular information.

## 5)Managing LCR Special DB\_

### 1. Selecting Menu in the MAP

[DataBase DB Management] ⇒ [System DB Management II] ⇒ [LCR SPECIAL DB]

Index	Special Code	LCR Route Table
400		0
401		0
402		0
403		0
404		0
405	800546460	12
406		0
407		0
408		0
409		0
410		0
411		0
412		0
413		0
414		0
415		0

Index Rx Code Rx Record Rx Append Tx Delete Tx Modify Tx

Special Code 800546460

Update

### 2. Browsing

Press the [Index Rx] button per Index access, then enter the Index number to be accessed.

Press the User Digit key per User Digit, then enter the User Digit to be accessed.

Press the Record List key per Record, then enter the Record number to be accessed.

#### - Special Code

LCR SPECIAL DB is searched after the Ext.Len (Extension Length) of the LCR CODE DB is entered.

Maximum of 20 digits able to be entered.

#### - Route Index

If a value identical to Special Code is found in the DB during search, it is used as new Route number [ 12 ] of LCR ROUTE DB . The Route Index value[2] of LCR CODE DB is meaningless at this time.

### 3. Appending

Special Code can be added by pressing the Append Tx tab.

### 4. Deleting

Enter the Index of Special Code to be deleted after pressing the Delete Tx tab.

### 5. Modifying DB

Enter the Index of Special Code to be modified after pressing the Modify Tx tab.

### 6. DB Update

Information must be transmitted to the system by pressing the [Tx] button after adding, deleting, or changing DB.

## 6) Managing LCR Class DB

Designate LCR Class when only parts of LCR function is to be used according to the caller's COS. Restriction of LCR function is possible for LCR Class that is too low.

### 1. Selecting Menu in the MAP

[DataBase DB Management] ⇒ [System DB Management II] ⇒ [LCR CLASS DB]

Caller COS	Allowed LCR Class	Caller COS	Allowed LCR Class	Caller COS	Allowed LCR Class	Caller COS	Allowed LCR Class
0	0	16	0	32	0	48	0
1	1	17	0	33	0	49	0
2	2	18	0	34	0	50	0
3	3	19	0	35	0	51	0
4	4	20	0	36	0	52	0
5	5	21	0	37	0	53	0
6	6	22	0	38	0	54	0
7	6	23	0	39	0	55	0
8	6	24	0	40	0	56	0
9	6	25	0	41	0	57	0
10	6	26	0	42	0	58	0
11	6	27	0	43	0	59	0
12	6	28	0	44	0	60	0
13	6	29	0	45	0	61	0
14	6	30	0	46	0	62	0
15	6	31	0	47	0	63	0

### 2. Browsing, Appending, Deleting

**Caller COS** : Caller[user]'s COS.

**Allowed LCR Class** : LCR Class to allow LCR function service.

## 7) Managing LCR Time Zone DB

You Can designate Group No. by each tenant. The system will refer to the Time Band of time zone DB by using the group number.

### 1. Selecting Menu in the MAP

[DataBase DB Management] ⇒ [System DB Management II] ⇒ [LCR TIME ZONE DB]

Tenant	Time Zone Table [0 - 15]	Tenant	Time Zone Table [0 - 15]	Tenant	Time Zone Table [0 - 15]	Tenant	Time Zone Table [0 - 15]
0	0	16	0	32	0	48	0
1	1	17	0	33	0	49	0
2	2	18	0	34	0	50	0
3	3	19	0	35	0	51	0
4	4	20	0	36	0	52	0
5	5	21	0	37	0	53	0
6	6	22	0	38	0	54	0
7	7	23	0	39	0	55	0
8	8	24	0	40	0	56	0
9	9	25	0	41	0	57	0
10	10	26	0	42	0	58	0
11	11	27	0	43	0	59	0
12	12	28	0	44	0	60	0
13	13	29	0	45	0	61	0
14	14	30	0	46	0	62	0
15	15	31	0	47	0	63	0

### 2. Browsing

The information set up in the system comes up when the [Rx] button is pressed.



## 8) Managing Time Zone

### 1. Selecting Menu in the MAP

[DataBase DB Management] ⇒ [System DB Management II] ⇒ [TIME ZONE DB]

### 2. Browsing

The information set up in the system comes up when the [Rx] button is pressed.

## 9) Managing LCR Route DB\_

DB used to decide the trunk group among the 4 time zones (Time Band 1, Time Band 2, Time Band 3, and Time Band 4) designated in the TIME ZONE DB. 1 system can have 256 (0~255) Route Tables.

### 1. Selecting Menu in the MAP

[DataBase DB Management] ⇒ [System DB Management II] ⇒ [LCR ROUTE DB]

Step	Time Band 1				Time Band 2			
	Trunk Group	Call Type	LCR Class	LCR Modify Table	Trunk Group	Call Type	LCR Class	LCR Modify Table
0	10	Local	10	0				0
1	12	Toll	5	0				0
2	14	ISD	0	0				0
3				0				0
4				0				0
5				0				0
6				0				0
7				0				0

### 2. Browsing

Enter the Route number to be received by pressing the [Rx] button.

8 steps (0~7) are available. The most inexpensive price is applied in step 0 and a more expensive price is applied every time the step goes up. The qualification to go to the next step is when all the present Trunk Ports are All Busy, MMC Block, or Faulty Block. If the same condition comes up at the 7<sup>th</sup> step, it is managed at Busy or Error.

#### - Trunk Group

One can designate the appropriate trunk group number for each TIME BAND1 ~ TIME BAND 4. Of course, the trunk group must be one that forms a perfect trunk group (0~255). Trunk selection of step 0 is designated with the most inexpensive trunk line, and the next trunk line the next low price.

#### - Call Type

Stands for Route Call Type. An important form of call in deciding Call billing, Call Type is newly designated when the Call Type of "LCR CODE DB" is to be changed or when it must be applied. If no value is designated, the Call Type of "LCR CODE DB" is applied. Designation of Call Type must be done in either "LCR CODE DB" or "LCR ROUTE DB."

For example, if the call type of digit pressed by the user is under TOLL in "LCR CODE DB" and TIE TOLL in "LCR ROUTE DB," the service level is inspected using TIE TOLL. Therefore, the final factor to deciding the call billing is the Call Type [TIE TOLL]changed finally in "LCR ROUTE DB."

### - LCR Class

Stands for LCR service level and is applied when a trunk call is to be restricted. If the Allowed LCR Class value [0]decided by the caller COS in "LCR CLASS DB" is lower than that of the present LCR Class value[10], the appropriate LCR function is serviced. In other words, if the allowed LCR class is Lower than this LCR class, LCR call is allowed. If the LCR class is higher than this LCR class, LCR call is restricted

Note :

The higher number of COS is, the lower service is provided

### - LCR Modify Table

Number used to refer the Index (0~255) of "LCR MODIFY DB." Each level may have different LCR Modify Table value. In other words, different LCR Modify Table Index of "LCR MODIFY DB" is referred to.

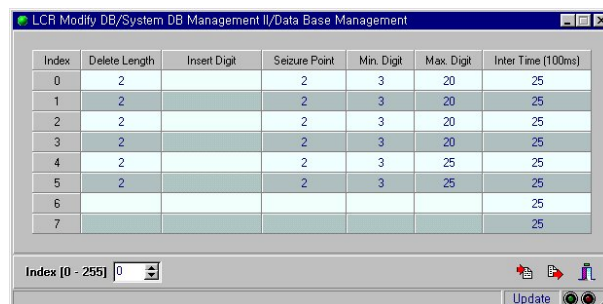
## 3. DB Update

Press the [Tx] button to Update the DB to the system.

# 10)Managing LCR Modify DB\_

## 1.Selecting Menu in the MAP

[DataBase DB Management] ⇒[System DB Management II] ⇒ [LCR MODIFY DB]



Index	Delete Length	Insert Digit	Seizure Point	Min. Digit	Max. Digit	Inter Time (100ms)
0	2		2	3	20	25
1	2		2	3	20	25
2	2		2	3	20	25
3	2		2	3	20	25
4	2		2	3	25	25
5	2		2	3	25	25
6						25
7						25

Index [0 - 255] 0

Update

## 2. Browsing

Enter the LCR Modify Table Index to be sent by pressing the [Rx] button.

### - Delete Length

Digit length from the first digit to be deleted in sending the digit to the exchange(C.O), and when it is designated as 2, the digits excluding the first two are sent to the opposing station.

### - Insert Digit

Enter the digit to be inserted from the point of deletion to the system. Used to change the digit pressed by the user.

### - Seizure Point

Stands for the digit length that decides the point where the trunk port is actually seized during analysis of digit. For example, if this value is set as '2', trunk is seized when user press the first two digits (LCR access code(80) ).

### - Min.Digit

The minimum digit length for trunk call. The user must press at least the number of digits designated here to connect a trunk call. Ext-Inter-Tm of the trunk group info DB is applied at this time.

- **Max.Digit**

The maximum digit length for trunk call. The user cannot press more than the number of digits designated here to send a trunk call. If it is exceeded, all the exceeding digits are ignored and only those within the Max Digit limit are sent to the exchange CO.

- **Inter Time**

If the user does not press the next digit within the time designated when making a trunk call, it goes to Error tone.

## OPERATING PROCEDURE

1. Lift the handset.
2. Enter the Trunk Access Code registered on the LCR already registered to DB.  
If All busy, MMC Block, or Faulty Block occurs in the most inexpensive trunk group, the trunk group of the next level is to be seized. If LCR Next Routing Tone is designated, the Routing Tone is heard. This tells the user that the trunk group of the next level are being Searched.
3. The user enters the called number to use for calling externally after hearing the trunk send alert.
4. Send ring to the called party telephone.
5. The called party user answers to the incoming trunk call.
6. Do telephone conversation.
7. Hang up.

## RESTRICTIONS

➤ **In case, the Feature ID is LCR in the [Numbering plan] DB :**

Reference procedure is → LCR Code DB → LCR Class DB → LCR Time Zone DB → Time Zone DB → LCR Route DB → LCR Modify DB

➤ **In case, the Feature ID is Trunk in the [Numbering plan] DB :**

Reference procedure is Trunk Group Info → LCR Code DB(refer to only Call Type) → LCR Route DB → LCR Modify DB