11.A.2.6. Intersection Search

11.A.2.6.1. Intersection Search (by Step-by-step Retrieval Method)

The intersection search (by step-by-step retrieval method) is created supposing an application that displays a map according to the two names of cross streets entered as the search key.

In this specification, there are two ways considered as follows:

1-1) Retrieve the street by just typing the alphabet characters of one street name without narrowing down cities.

1-2) Retrieve the other crossing street(2nd street).

(In this step, the retrieval is made not to only the object in the range narrowed down in step 1-1 but to all streets.)

2-1) Narrow down the street by typing the alphabet characters of the city name known to user.

2-2) Retrieve one street (1st street) by typing the alphabet characters of the street name.

(In this step, the search is made to only streets in the cities within the range narrowed down in step 2-1.)

2-3) Retrieve the other crossing street (2nd street).

(In this step, the search is made not to streets within the range narrowed down in step 2-2 only but all streets handled in step 2-2.)

To reduce the data size, the street name search frame in Section 11.A.2.4 is used to narrow down street names, and street ID2 values numbered to street names corresponding to the two streets selected by the user are used for the search in this example.

<Data Configuration Overview>

This is an intersection search to be made after all the target street ID2 values are entered. A search is made for data that matches the street ID (two values) specified as the search key. B-TREE (Balance-TREE) used in general databases is used for its management system. Basically, matching data frames are sorted according to the search key (street ID). (For the search last layer, POI information frames may be used. In this example, no matching data is contained thus POI information is used.)

However, to store cross streets, a search key can be specified in two ways according to the order in which the two values are represented, then the data and its duplicate are stored. Therefore, the rules below are applied when this search frame is created.

Intersection search key creation rules

Search key configuration: U4 x 2 = 8 bytes (two values: all-street ID + cross street ID)

Search key configuration format: Consists of IDs of two cross streets (stid1 and stid2).
However, when stid1 > stid2, the search key is [stid1,stid2] and represented with an array in ascending order of the ID values. [stid2,stid1] is not stored as data.
For stid3 and stid3 intersections on the same street, [stid3,stid3] is not stored as data.

A Sequence of POI Information

Street ID1	Street ID2	Search key 'STID' , 'SIDC'	Area code	Latitude and longitude
00001000	00010000	00010000,0010000	0010 2355	North latitude Y1 and east longitude X1
:	:	:	:	……
0000 1015	0010 2541	00001015,00102541	00258 5765	North latitude Y2 and east longitude X2
0000 5024	0000 8574	00005024,00008574	0018 5463	North latitude Y3 and east longitude X3
0002 5785	0005 7543	00025785,00057543	0087 2542	North latitude Y4 and east longitude X4
:	:	:	:	……
0002 9751	0002 9752	00029751,00029751	0001 5685	North latitude Y5 and east longitude X5
:	:	:	:	……
0004 5146	0084 5986	00045146,00845986	0002 6575	North latitude Y6 and east longitude X6

Search key (sorted according to the intersection search key)

For the target data or POI information data sorted by key, category data in the structure of B-Tree is created. option records for the category data are not hierarchical. Inclusion of the target data is determined according to comparison with previous/following option records.

Note that it is presumed that an identical search key may be used double in this search frame. (Keys are not unique.)

11.A.2.6.1.1. Management Frame of Search Frame

name [Management Frame of Search Frame]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	16		Management Frame Header of Search Frame		a
2	16	X		Detailed Search Information Record - #1		a

11.A.2.6.1.1.1. Management Frame Header of Search Frame

name [Management Frame Header of Search Frame]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	4	C	Data Declaration	'DFSR'	a
2	4	4	N	Category and Number of Matching Data Count - G (Number of Detailed Search Information Records)	=1	a
3	8	4	SWS	Detailed Search Information Record Size	1)	a
4	12	4	D	Offset to the Top of Detailed Search Information Record	2)	a

1) This field describes the size of the detailed search information record. If there are two or more records, the records must have the same size.

2) The displacement from the top of the search frame management frame to the first record of the detailed search information record sequence is described, as it allows future expansion and manufacturer-specific data description.

11.A.2.6.1.2. Detailed Search Information Record

This search frame is configured with B-TREE search-type data used in the management method for index data.

In addition, the maximum size of a category or POI information to be read is 64 KB (guideline).

name [Detailed Search Information Record]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	4	C	Data Declaration	'SRBT'	a
2	4	4	SWS	Expansion Field Size	1)	a
3	8	4	D	Offset to the Expansion Field	1)	a
4	12	4	SWS	Category Definition Frame Size	2)	a
5	16	4	D	Address to the Category Definition Frame	3)	a
6	20	4	SWS	Category Data Frame Size	2)	a
7	24	4	D	Address to the Category Data Frame	3)	a
8	28	4	C	Default Keyboard Designation	NULL	a
9	32	4	SWS	Category Parent Record Size	4)	a
10	36	4	SWS	Category Option Record Size	5)	a
11	40	4	SWS	First-level Category Size	6)	a
12	44	4	N	Number of Option Items of the First-level Category	6)	a
13	48	4	D	Offset to the First-level Category	6)	a
14	52	4	C	Keyboard Designation for First-level Category	NULL	a
15	56	4	SWS	Matching Data Definition Frame Size	2)	a
16	60	4	D	Address to the Matching Data Definition Frame	3)	a
17	64	4	SWS	Matching Data Frame Size	2)	a
18	68	4	D	Address to the Matching Data Frame	3)	a
19	72	4	SWS	Size of the Record of the Matching Data Frame	7)	a
20	76	4	N	Total Number of the Records of the Matching Data Frame	8)	a
21	80	4	N	Default POI Information Number	9)	a
22	84	4	SWS	Next-level Data Frame Size	10)	a
23	88	4	D	Address to the Next-level Data Frame	10)	a
24	92	B1		Character Information Data List for Representation Item	11)	a
25	O1	B2		A Sequence of Additional Frame Address(es) (#1 to #4)	3)	c
26	O2	B3		Expansion Field		c
27	O3	B4		Padding Field		c

Note: Items 25 and 26 are optional in this detailed search information record since their areas can be determined by items 5, 7, 16, and 18. However, the detailed search information record size specified in the management frame header of the higher search frame must be satisfied by items 25 to 27.

1) Expansion Field Size and Offset

The field describes the displacement from the top of the applicable detailed search information record to the top of the expansion field as the offset to the expansion field. Since this example does not have an expansion field, invalid values 0 is assigned to the size and offset.

2) These fields describe the total size of the target data frame.

3) These fields describe the address of the target data frame according to the representation format of 7) in Section 11.A.2.1.2.

4) This field describes the size of the category parent record.

5) This field describes the size of a single category option record.

6) Size, Number of Option Items and Offset of the First-level Category

These field describe the size of a category ranging from the first-level category to the last level to be read. (i.e., this is not the actual first-level category size but the maximum category size.)

Since the B-Tree type search frame is declared in this example, the size specified for the first-level category may be larger than the size of the actual first-level category.

7) Size of the Record of the Matching Data Frame

Since this example does not contain any matching data frames, specify the invalid value 0.

8) Total Number of the Records of the Matching Data Frame

Since this example does not contain any matching data frames, specify the invalid value 0.

9) Default POI Information Number

This field describes the target intersection POI information number.

10) Size and Address of the Next-level Data Frame

Since this example does not contain any next-level search frames, assign the invalid value 0 to these fields.

11) Character Information Data List for Representation Items

This field describes the name to be searched, which is defined by the function specifications of the system.

ex) English: 'INTERSECTION'

11.A.2.6.1.3. Category Definition Frame

No.	Usage	Description type	Description type declaration	Number of data items	Additional information	Comment	Remarks	Classifi-cation
1	‘DCTF’	‘REAL’	-	-	(7)	Definition Field Declaration		a
2	‘SELN’	‘NORM’	‘UL’	1	-	Number of Option Items		a
3	‘DCSF’	‘REAL’	-	-	(5)	Option Record Definition Field Declaration		a
4	‘STID’	‘NORM’	‘UL’	1	-	Street ID (Search Key)		a
5	‘SIDC’	‘NORM’	‘UL’	1	-	Cross Street ID (Search Key)		a
6	‘NXKD’	‘NORM’	‘UH’	1	-	Next-level Data Frame Type	1)	a
7	‘NXFN’	‘NORM’	‘UH’	1	-	Next-level Data Frame Number	1)	a
8	‘NXST’	‘OFST’	‘LG’	1	-	Offset to Next-level Data Frame	2)	a

1) These fields describe the type and number of the next-level data frame as follows:

Category search level: NXKD=1 (category) NXFN=0 (invalid value)
Category end level: NXKD=3 (POI information) NXFN=n (POI information number)

2) Next-level Data Frame Offset

This field describes the displacement from the top of the data frame specified in the next-level data frame indicated above to the top of the target data.

Note: Since the next-level data frame size used when each category or POI information is referenced is the B-TREE type search frame, the maximum size indicated in the first-level category table size for the detailed search information records is guaranteed. (This restriction on the size also applies to the size of POI information to be read.)

Note: Category tables (option records) are placed in order of street ID and cross street ID.

Note: Stored by street ID. (However, if the size of the target POI information to be read is large, it is divided by the first-level category table size for the detailed search information records, then stored.)

11.A.2.6.1.4. Category Data Frame

name [Intersection Search Category Data Frame]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	B1		Intersection Search Category Data Frame		a

11.A.2.6.1.4.1. Category Table

name [Intersection Search Category Table]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	B1		Intersection Search Category Parent Record		a
2	O1	B2		A Sequence of Category Option(child) Records		a

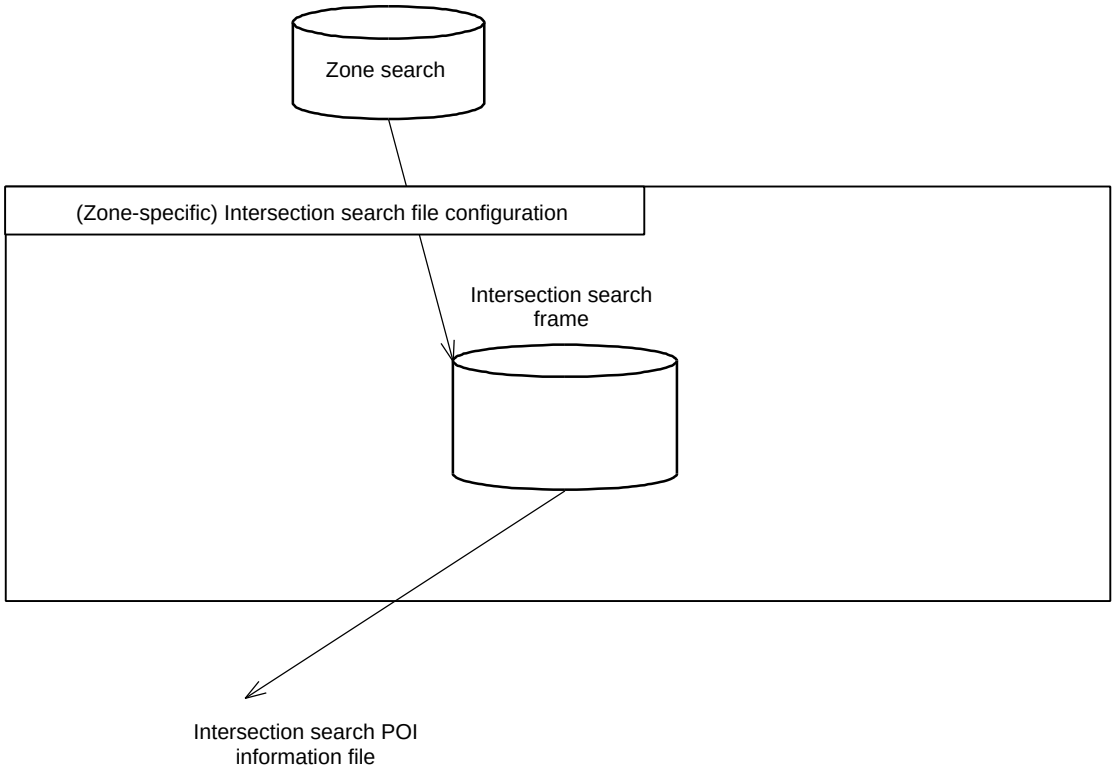
name [Intersection Search Parent Category Record]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	4	N	Number of Option(child) Items		a

name [Intersection Search Category Option(child) Record]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	4	N	Street ID (Search Key)		a
2	4	4	N	Crossing Street ID (Search Key)		a
3	8	1/2	N	Next-level Data Frame Type		a
4	8.5	1/2	N	Next-level Data Frame Number		a
5	9	4	D	Offset to the Next-level Data Frame		a
6	13	1	BR	Padding Field		c

11.A.2.6.1.5. Intersection Search File Configuration



-File Configuration of Intersection Search