TABLE 1 GPS COMPRESSED DATA PACKAGE FRAME STRUCTURE

bits	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
64	Time(30bits)															
	Longitude(21bits)															
				Latitude high 12 bits												A/V
16	Latitude low 9 bits									Speed(5bits)					Reserved	

By the shift operation, we can encapsulate effective digital GPS data into a compressed data package frame. Table 2 gives the compression algorithm based on GPS data package per frame (mobile terminals side). Table 3 gives the GPS data package per frame decompression algorithm (cloud services side). Algorithm takes the form of c pseudo-code (code as close as possible to MicroSoft C/C++, can pass C/C++ compile via a small modify). In the code segment, pbuf as a pointer to a data buffer, BaseTime, BaseLong, BaseLat are seed data for time, longitude, latitude. Prefix i64 is for 64 bit certification.

TABLE 2 COMPRESSION ALGORITHM BASED ON GPS DATA PACKAGE PER FRAME

```
i64Long = (__int64)(dlong * 1000000.0 );
i64Lat = (__int64)(dlat * 1000000.0 );
int iSpeed = (int)(dSpeed );
```

```
unsigned __int64 d = 0;
(state=='A')?d |= 0x0000000000000001:d |= 0x0000000000000000;
d |= (i64Time - m_i64BaseTime) << 34;
i64dxLong = i64Long - i64BaseLong;
i64dxLat = i64Lat - i64BaseLat;
d |= i64dxLong << 13;
d |= (i64dxLat >> 9) << 1;
memcpy(pbuf, &d, sizeof(d));
unsigned short c = 0;
c |= i64dxLat << 7;
c |= iSpeed << 2;
memcpy(pbuf + 8, &c, sizeof(c));
```

TABLE 3 DECOMPRESSION ALGORITHM BASED ON GPS DATA PACKAGE PER FRAME

```
(d & 0x00000001)? state='A'; state=='V'
unsigned __int64 d = *((unsigned __int64 *)pbuf);
unsigned short c = *((unsigned short *)(pbuf + 8));
```

```
CTime t((d >> 34) + m_i64BaseTime);
dlong = (double)(__int64)(((d & 0x00000003ffffe000) >> 13) + i64BaseLong) / 1000000.0;
dlat = (double)(__int64)((((d & 0x0000000000001ffe) << 8) | (c >> 7)) + i64BaseLat) / 1000000.0;
dSpeed = (double)(int)((c & 0x007c) >> 2);
```

IV. CONCLUSION

Some applications have a very strong time and geographical nature. For these applications, you can use centralized cloud service to delivery difference seed data to different mobile terminals (such as geographical "Origin" or "Center" coordinates), and mobile terminal processed local data (such as GPS coordinates), upload the compressed data. That is mobile terminals removed redundant information, recoded, uploaded to a cloud server-side, cloud server can decoding based on seed information to complete data processing.

This paper analyzes the characteristics of GPS data in the LBS service, through pretreatment and digital for GPS data, then removing redundant information from GPS data with seed, at last by shifting coding to complete data compression. Thus change the raw data (about 70 bytes) to available 36 bytes, then from 36 bytes to 10 bytes through compression. The Main operations can be implemented by and, or and shift operation, can improve coding speed, saving memory resources. Algorithms are based on the frame, has a compression ratio stability, can be applied to dozens of bytes or less small amounts of data to complete effective compression. Through data compression, you can save mobile terminal data transmission bandwidth and communications costs, extend the mobile terminal battery charge time.

Because there are powerful computing resources and performance in the cloud server side, cloud server can provide optimized seed to different mobile terminals applications (for example, inspection, data collection, customer service). For example, can be based on historical data of inspection operations personnel, specify the active route information, and so on, by least square algorithm to generate more optimal seed, further improve the efficiency of compression.

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