September 24, 1997
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Conceptual Proposal for GSM Operation in Japan (Ver. 1)

1. Introduction and background

(1) Japan is notorious for being one of the only few countries where GSM users can not roam to, especially in Asia, sharing the reputation with Korea.

(2) Recently, around six months ago, after receiving some pressure from EU to open the market for GSM, Japanese MoPT stated that the available radio spectrum for GSM in Japan is only a few MHz band, which is not enough to satisfy the demand, and no operator would have interest in GSM operation in Japan under this limitation, according to news papers.
Further, un-official source said that during the Germany - Japan negotiation on Spectrum allocation for PHS in Germany, Japanese MoPT proposed to open a few MHz band for GSM operation in Japan, however, that was not accepted by German government.
The above implies that some frequency spectrum is available even in a small amount, and Japanese government may accept GSM standard if that is beneficial.

(3) This paper describes my personal initial idea for some possible and realistic GSM operation in Japan, especially in Tokyo.
Proposed network configuration uses mobile switch in Hong Kong and international digital leased circuits to Tokyo connecting the base stations installed in Tokyo. Tokyo service area will be an extension of Hong Kong area.
The target customers are limited to international roaming users of GSM who visit Tokyo.

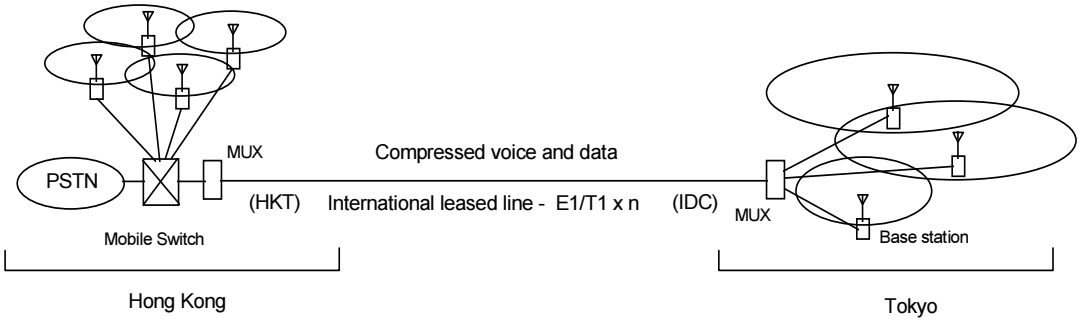
2. Target customers

As we ourselves experience, now international cellular roaming became indispensable for daily business activities. Our business activities are so dependent on this service that the inconvenience we experience in such GSM roaming unavailable countries is something provoking and is damaging the image of the countries.
According to the paper presented at the PHS In Europe Conference, there are 3 million visitors to Japan from GSM covered countries every year. Many of them should have experienced the same frustration.

Assuming that 1/3 of that 3 million visitors are GSM users and they stay in Tokyo for one week, on the average, then 20,000 GSM users are estimated to exist in Tokyo always.
This number seems to be relatively small for a target users for cellular service, however, most of them would be the most busiest business people and they are expected to be extreme high-end users. They are the most profitable customers.

3. Network configuration

Frequency resource will be very limited, so probably, installing a complete cellular network which has an independent mobile switch with a small capacity, connecting and accessing to PSTN in Japan, would not be feasible. Here, extension of HKT CSL's network to Tokyo by using international leased circuits is proposed.



Considering that most of the users are visitors from outside Japan and they will use this service mainly for their international calls to their home countries, this network configuration will make sense.
Without this service, they would have called from their hotels. This service will absorb some international traffic in Tokyo to/from all over the world, via Hong Kong acting as a hub.
In a sense, this service is highly cream skimming, i.e. "mobile" plus "international".
By taking this configuration, initial capex cost can be minimized, and this can enable quick deployment.
Most of the existing functions in Hong Kong can be utilized, i.e. mobile switch, HLR, roaming agreements with various operators, clearing arrangements with operators, billing, etc. with small modification (to identify the Japan roaming users).

4. Rough capacity estimation

If we assume that 5 MHz band (just an assumption, to be confirmed), for uplink and downlink each, is allocated for GSM in Tokyo, and large cell configuration consisting of 33 cells (each cell consists of 3 sectors) are used to cover Tokyo, and 3 sector x 4 cell frequency reuse is adopted, then the subscriber capacity for Tokyo would be calculated to be 35,000.

(Please see the calculation sheet attached)

This capacity will be acceptable if we take the rough estimation of 20,000 users in Tokyo (see section 2).

5. Benefit

(1) Benefit for Japan

- Value and efficiency of Tokyo, as an international capital, increase.
- Tokyo can attract more visitors.
- Japanese government can show its open and fair policy, an user oriented attitude, eliminating the criticism that Japanese market is closed and non-global.
- Can use acceptance of GSM as one of the negotiation tool for the PHS introduction to Europe.
- Increase the international traffic.

(2) Benefit for Hong Kong (HKT/C&W)

- CSL can differentiate from the competitors, with better roaming services.
- Can increase mobile traffic and revenue (CSL).
- Can gather international traffic by using GSM coverage in Tokyo as a casting net (HKT).

(3) Benefit for the world

- Better service for all the GSM users

6. Conclusion

As examined briefly above, this business will be :

(1) Low risk and high return, even if the size would be relatively small

- Cream skimming of both “mobile” and “international”
- Small initial cost
- At this moment, there is no competitor. The position of Hong Kong is very favorable for this service.

(2) Strong demand

- We should remind how much we do pay to hotel bill in Tokyo for international calls, per day !
- 3 million visitors to Tokyo from GSM covered countries every year.

(3) Worth further detailed study

Capacity calculation

Assumptions

- Available frequency : 5 MHz x 2
- Frequency re-use pattern : 3 sector x 4 cell
- Number of cells in Tokyo : 33 cells (99 sectors)
- Blocking rate (GOS) : 0.03
- Traffic : 0.03 erlang / sub

Calculation

- Available radio carriers : 25 pairs
  5 MHz / 0.2 MHz

- Available number of radio carriers per sector : ~ 2 pairs
  25 / (3 x 4) = 2.083

- Number of voice channels per sector : 16
  8 (ch) x 2 (carrier) = 16 (ch)

- Maximum traffic per sector : 10.5 erlang
  From 0.03 of GOS and 16 ch per sector

- Maximum subscriber capacity per sector : 350 sub
  10.5 / 0.03 = 350

- Total capacity : ~ 35,000
  350 x 99 = 34,650

Result : Theoretical capacity is calculated as around 35 K subscribers