Global Tracking System

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Yes __ Please keep our idea confidential if we were not selected as finalist/semi-finalist**.**

Introduction:

A car is stolen every 26 seconds in the United States [3]. According to the British Crime Survey, a vehicle is stolen every 4 minutes [4]. And, in Australia, a vehicle is stolen every 10 minutes [5]. How about third world countries? Car theft is a challenging problem everywhere in the planet that seeks a solution. GPS sensors hooked up to wirless Internet or phone service because thieves mostly take cars out of covered areas. Thus, a solution with satellite constellation is introduced covering the whole world with very high profit gain in this paper.

1. Key Concept and Business Impact on Society and Environment

A corporation that provides a commercial object tracking service for any object anywhere on Earth on near real-time.

Through a secure web portal or Smartphone portal, a user can access the location of the targeted object. Objects could be precious items, vehicles and even humans. For example, a customer car's location in case it's stolen or if they accidentally forgotten their vehicles parking location, this service can also be provided for multinational cargo companies where they can track their cargo ships, freighters and vehicles fleet rout, also for safari, hiking, and mountain climbing enthusiasts would provide them with a safe low cost tracking system working efficiently everywhere independent to wireless Internet/mobile coverage. Also this would work as a high performance and efficient system for Armies, police, search and rescue, banks as well as insurance companies.

Throught the web or phone portal, the customer will have the accessibility to track the item/person/vehicle five times a day for free, a pro version of the application would be available for whoever wants to upgrade to the higher version.

Tracking is done using a ground sensor attached to the item/person/vehicle the customer wants to track where it would uplink data to the satellite and the customer would have the access to know its location in real time. Using a network topology among satellites, data is transferred to the satellite that is currently exposed to a ground station, downlink it and the ground station makes it available through the portal.

Since the payload is not fully used, a rental space is sold to get maximum advantage of the constellation system.

2. Business Model Structure

Who: a multinational civil organization based on a world major city with third party distributors in targeted markets around the world.

When- Service is available when all satellites are in their orbits.

What: The coverage would be 100% all over the earth 24/7 when all 32 satellites are located in their orbits.

How- All the services are provided to a two billion internet users worldwide [1] and approximately a billion smartphone users around the globe according to insights observed from [2]. The platform would be operating system independent, meaning that it will operate on all smartphone such as android, iOS, BlackBerry and tablets. The web platform will start from browser to reach all Internet users everywhere regardless to their system capabilities or operating system to ensure maximum exposure to all users.

Why-How much - The hardware component (ground sensor attached to GPS) is sold for $400 including free download to the smartphone app and free access to the web portal. A Pro version is available if the user needs to access the location of the object more than 5 times a day for $5 a month.

3. Business Feasibility

COST

One time cost

Component	Cost (M$)
Bus - Low level bus	0.5
Communication payload	0.1
Rental Space	0.2
Total cost	0.8M$

Total cost of all satellites

32 * 0.8 = 25.6M$

Launch cost

Sending 4 rockets, one to each orbit. Since only 8 locations required in each orbit, 7 free slots for a piggyback satellites are available to get in, one for 4 million dollars.

Launch cost = rocket cost * 4 rockets - free slots * rockets * 4M

= 25 * 4 - 7 * 4 * 4 = -12M$

Which means a gained profit with 12M$ however, it's expected that not all slots are occupied. As an average, 5 slots of 7 available would be free leading to launch cost = 20M$

Manufacture/Buy of 1M ground sensor attached to GPS
120$ * 1M = 120M$
Ground Station Development
0.05M
Software Development
0.05M$
Distribution and travel expenses
2M$
Advertising and marketing
4M$

Unadjusted Total Cost
171.7M$
Unexpected one time Operations:
5% of total one time cost = 8.5M$
Total One Time Cost
180.3M$

Yearly operations
Single Ground Station
0.1+0.5=0.6M$
Software maintenance
0.01M
Revenue
Selling one million ground sensor for 400$ each
400 * 1M = 400M$
Rental Space
Expected to use it in up to 20 satellites (to meet with deadlines with no delays)
20 sat * 0.2M (cost of rental space deployment) + 20*0.2* 20% profit = 4.8M$

So, payback time is the time by when 450K ground sensors are sold.
Profits after selling 1M ground sensors = 1M * 400$ each = 400M$
Depending on marketing/advertising, time taken to sell 1M piece would take up to two years more or less. If so, yearly profit = 110% yearly.
The company could largely expand if it convinced a main producer such as Toyota, Honda or Ford to become a partner and had a built-in ground sensor in each manufactured car.

4. Logistical Feasibility

Payload
Communication payload (20%) and rental space (80%)
Bus level
Low level bus 9.6kbps
Number of Satellite/orbits
Total of 32 satellites. 8 satellites on 4 orbits.
Number of ground station
Single ground station
Launch Configuration
Four rockets. One for each orbit. Remaining slots are sold for piggyback satellites.

Note: more details to be given in the final paper.

5. Risk Analysis

1) Lag of the service:
Due to the relatively low number of ground stations, this could lead to a non-real time tracking service and this would be solved by using a network topology between all the satellites where the satellite located overhead the ground station would receive the data from the far satellite through this network and send them forward to the ground stations located below.

2) System failure in one of the satellites:
System failure in one of the satellites won't be that critically effective due to the presence of a relatively high number of satellites on the same orbit and also by gathering info. through the nearest surrounding satellites located on the nearest orbits presented at the nearest desired location.

3) failure in one of the ground stations:
In case failure took place in one of the ground stations, the down link would be loaded on the other ground station through the network topology between satellites that we have mentioned before, so the whole system won't be effected.

4) Launching delay:
Using piggyback launching method for this satellite constellation would be more economical but the launching process timing itself is not controlled due to lack of scheduled launching operations so the system won't work with a global 100 % coverage service except when all the satellites are fully operating in their orbits, and this issue could be solved by using one or more dedicated rocket besides the piggyback launching process

References

List any references for your idea

[1]http://www.independent.co.uk/life-style/gadgets-and-tech/number-of-internet-users-worldwide-reaches-two-billion-un-2195157.html

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[4]
http://avcis.police.uk/car-crime-prevention/q-how-many-cars-are-stolen-in-the-uk-each-year/

[5] http://www.carsafe.com.au/