data

hopper

Easy, affordable data access for international travelers.
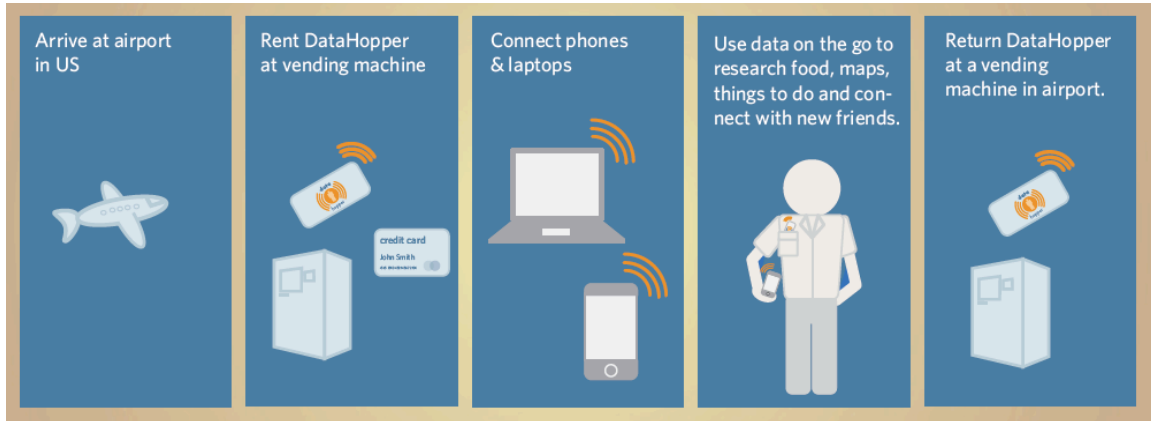
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Course   Designing for Mobile Services (Spring 2011)

1 WHAT IS DATAHOPPER?

50 million international travelers arrive in the United States each year. Unfortunately, the moment they cross an international border, their access to technology is reduced back to 1988-levels: their old data plans don't work.

DataHopper solves this problem for the international traveler. It is a service that provides inexpensive short–term internet access to international travelers. Think "Redbox for data."

Arrive at airport in US	Rent DataHopper at vending machine	Connect phones & laptops	Use data on the go to research food, maps, things to do and connect with new friends.	Return DataHopper at a vending machine in airport.

This service diagram explains how customers discover and use DataHopper. First, the service is accessed at vending machines inside of airports. This helps customers discover and access the service easily. Second, billing is simple – they swipe a credit card at the vending machine. The setup of the device is also simple: the customer turns on their DataHopper portable router as well as their cell phones and laptops, which seek a wifi signal and find one labeled "DataHopper." The DataHopper is labeled with a password, such as "blueplane." After entering this password, the devices will remain connected to the internet as long as the DataHopper is on and within a ten foot radius of their cell phones and laptops (so customers can just put the DataHopper into their pocket and move about the city as they normally would). They are able to access all of the applications they are accustomed to using at home as well as additional applications that might help them when traveling. Meanwhile, the service is extremely affordable, with a $10 activation fee and $3 daily rental fee for unlimited data usage.

For more information, see the following appendices:

Appendix A: Service Blueprint
This shows the details of how our service will work, as well as the various touchpoints and interactions behind-the-scenes.

Appendix B: Wireframes
These wireframes showcase the different screens on the vending machine.

We set out to research the needs of international travelers, and spoke with six American travelers who had recently traveled abroad and six foreign travelers who were visiting Pittsburgh. Their needs when traveling were varied and included the correct pronunciation of foreign words, meeting locals, properly using local transport, tipping etiquette, finding local food and driving directions, documenting their trip, and accessing email. This list goes on and on, but the pressing need underneath it all was for data. Travelers didn't need a new application to solve all of their issues; they needed access to all of the applications they had come to rely on in their country of residence. The lack of data while traveling led to frustration and excessive fees.

Quotes & Stories

"Roaming (while abroad) is a ridiculous amount of money."

— Julia, student, United States

For instance, Julia vowed not to use roaming on her trip abroad, but eventually turned it on after getting on the wrong train in Germany and winding up in Denmark instead of the Netherlands. She was hit with exorbitant fees.

"Oh, that (data) would have been amazing. We could have accessed Yelp, CouchSurfing and maps."

— Terry, engineer, France

Terry was visiting Seattle for the first time. He bought a disposable phone and rented a car and GPS, but his main need (finding interesting local restaurants) was still unmet, even with all of these purchases.

...and Juan was visiting from Mexico for a conference in Pittsburgh. He wanted to meet people, network, and become Facebook friends while comparing his city to Pittsburgh. This wasn't feasible for him without access to email and Facebook, but would have been possible if he had data for his smartphone.

Findings & Summary

In short, foreign travelers need **data** to help them with navigation, finding food, checking email, finding things to do, and even meeting new people; DataHopper solves this problem for foreign travelers to the US.
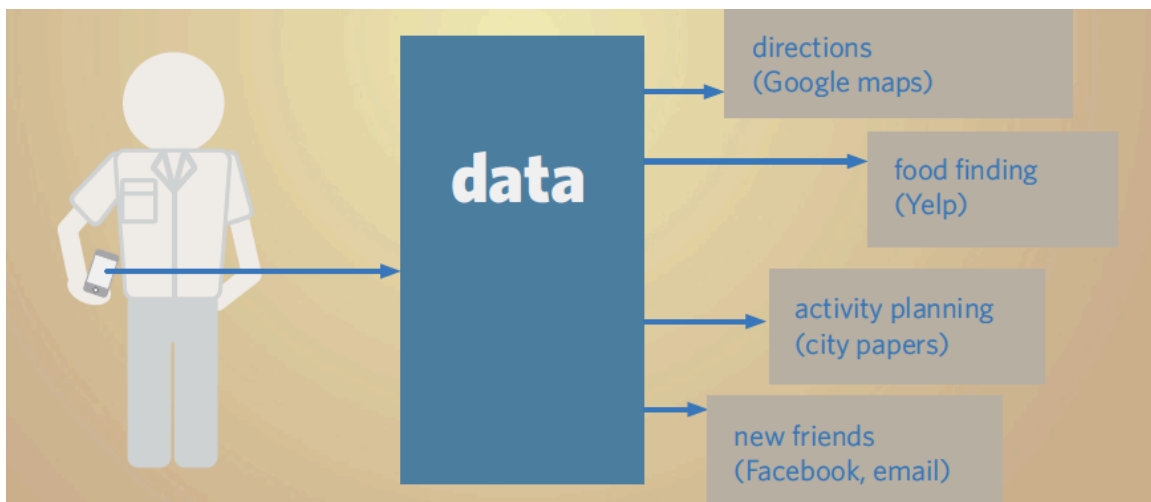
The other alternatives that these travelers had really didn't suffice for their needs. First, DataHopper is far less expensive and more easily discoverable than the alternatives: customers avoid the daily costs of hotel wifi rental of $10 a day and GPS rental of $16 a day, and they certainly don't have to deal with the per megabyte costs of roaming that can be as much as 20 MB for $20 dollars. The main competition to DataHopper is XCOM Global: they also provide wireless routers to international travelers. However, they are very expensive and require advance planning on the part of the traveler. For

example, if I am traveling from Germany to the United States for a two-week trip, I would first have to discover XCOM (none of our participants had), order a router, pay $30 dollars for shipping, wait for the device arrive at my home in Germany, take it to the United States with me, use it, return to Germany, and then send it back. The daily fee for using their portable router is $17. The total expenditure would be $268.

With DataHopper, this same traveler would discover our service while at the airport in the United States, rent a DataHopper from a vending machine, use it for two weeks, and drop it off at the vending machine while on their way home. The total cost for service with DataHopper during the same trip would be $52.

In short, DataHopper solves the traveler needs of:
- staying in contact with friends at home and new local friends
- feeling independent and confident while traveling
- using familiar services (Google Maps, Urban Spoon, etc)

...and prevents the hassle of:
- borrowing laptops & phones
- searching for free or paid wireless throughout the city
- trying to figure out highly technical solutions like replacing SIM cards or needing to ship devices from XCOM

Given our analysis of market desires and existing solutions, we concluded that DataHopper would fill a huge need that is currently unmet.
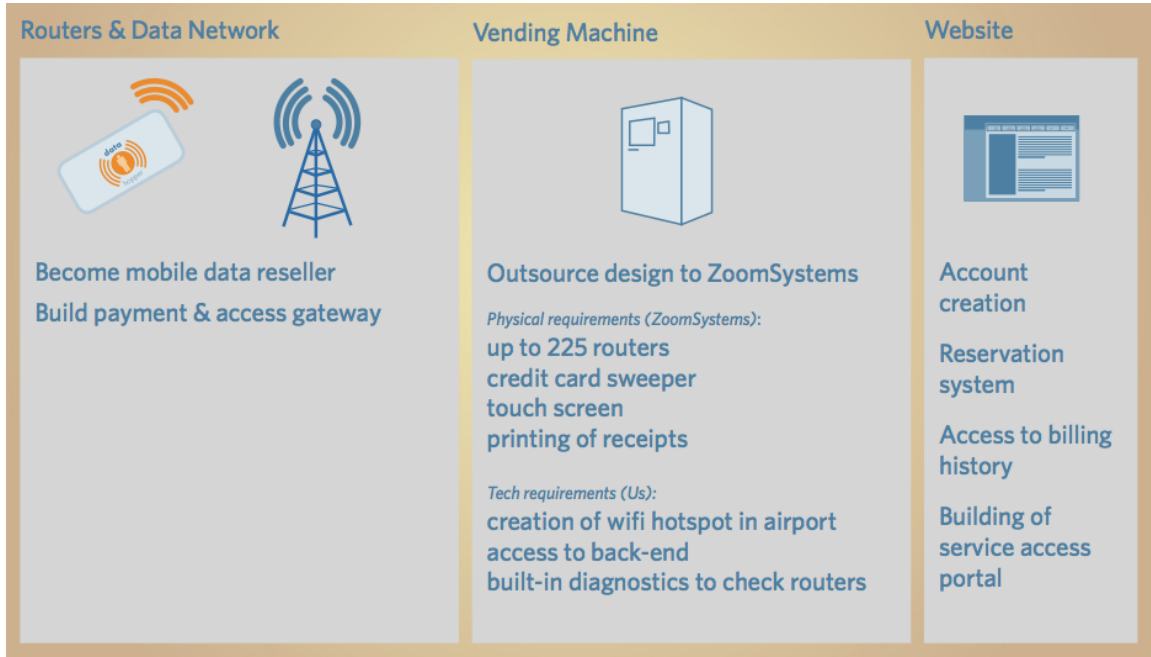
For more information, see the following appendices:

Appendix C: Value Opportunity Analysis
The value opportunity analysis pits DataHopper's intangible value against our primary competition, XCOM Global.

3 TECHNICAL FEASIBILITY

The three main components of DataHopper include the DataHopper router devices, the vending machines in airports, and our website.

Routers & Data Network	Vending Machine	Website
Become mobile data reseller Build payment & access gateway	Outsource design to ZoomSystems *Physical requirements (ZoomSystems):* up to 225 routers credit card sweeper touch screen printing of receipts *Tech requirements (Us):* creation of wifi hotspot in airport access to back-end built-in diagnostics to check routers	Account creation Reservation system Access to billing history Building of service access portal

DataHopper Devices

Our routers are simply branded Mifi devices; such devices have been in the market for a good deal of time, and there are many companies willing to sell them to us in bulk.

The majority of the work that needs to be done to get these devices working is providing the data infrastructure behind them. We will need to become a "mobile data reseller;" this involves renting data spectrum from a major data provider (for instance, AT&T) and using that amount of data to power our own Mifi devices.

Vending Machines

Special vending machines need to be developed for storing, dispensing, and returning these DataHopper devices. Up to 225 devices are held by each machine.

We plan on outsourcing the design and development of these vending machines to a company like Zoom Systems, which has a proven track record in developing highly customized and high-tech vending machines for clients like Apple, Best Buy, and Macy's. This company will handle the production and physical requirements of the machine, including the dispense and return mechanisms, the touch screen, receipt printing, and credit card/billing functionality.

Our technical team, on the other hand, will be developing special diagnostic software to run when the customer returns his data device. This diagnostic software ensures that the device is working properly. Meanwhile, we need to make sure that the machines interact with the back-end infrastructure we are using to monitor data devices and control the billing systems. Additionally, many vending machines may have a free wifi hotspot built in; this hotspot provides a small nexus of temporary free internet to international travelers in airports, and is solely intended to get them to discover the service.

Website for Planning, Reservation, & Support

Recognizing that a select few customers have advanced planning needs, the DataHopper website will allow customers who have already discovered the service to reserve a DataHopper in advance (interacting with the vending machines to ensure that there will be one available when they get to the US). Additionally, the site provides access to billing history and a support portal.

This website will be developed by our in-house team of designers and developers. We will be deploying the website on Heroku web services. Development will include creation of various front-facing services like account creation, reservation system, and billing history. We will also need to create back-end databases (e.g. for billing, vending machine and device status, and user history/information) and configure the server according to our development process.

Feedback from Technical Advisors

To resolve some of our technical issues and get feedback on the feasibility of becoming a mobile data reseller (otherwise known as a data-only MVNO, or "mobile virtual network operator"), we consulted two industry experts: Wendy Fong (Senior Strategic Program Manager at Carnegie Mellon Silicon Valley) and Juggs Ravalia (VP of Strategic Alliances at SPB Software, past experience at Microsoft with the Windows Mobile team and a Cambridge Gates Scholar).

We received encouraging feedback; the pair saw no technical or regulatory issues with our plan, and even stated that we had an advantage in limiting ourselves to international travelers coming to the US. Service providers hate bursty bandwidth usage; companies like XCOM rent data from a multitude of providers in a huge number of different countries, and are so spread out that their data usage is very inconsistent and bursty. By limiting ourself to one provider for our service, we have the advantage of providing consistent bandwidth use, which may give us leverage in rate negotiations with providers.

For more information, see the following appendices:

Appendix D: Deployment Roadmap
Our rough time estimates for development and deployment, including piloting and a limited deployment to select airports.

Appendix E: Block Diagram
A diagram outlining the major technical pieces of our service and the interactions between them.

BUSINESS PLAN

Target Audience & Market

DataHopper is a service for foreign international travelers who visit the United States. We plan to focus on the five largest international airports. These five airports service approximately 31,000,000 international travelers visiting the US per year, according to the 2008–2009 figures provided by the Bureau of Transportation Statistics. We expect to serve 1.9% (602,000) of the potential market of 31,000,000 million for travelers.

	New York (JFK)	Los Angeles (LAX)	Miami (MIA)	Chicago (ORD)	New York (EWR)
International Passengers	8.8 Million	6.3 Million	6.9 Million	4.3 Million	4.7 Million

While we do not know how many of these travelers used smartphones or laptops, we did discover the rapid growth of data-enabled smartphones in international markets. Global smartphone market sales totaled 303.4 million devices in 2010, and more than 450 million smartphones expected to be shipped in 2011. (Source: "IDC"). Most of these smartphones have internet connectivity using 2G, 3G, and 4G cellular data network. The use of 3G data technology grew 40% from 2009 to 2010 (Source: "Information Telecoms & Media, WCIS+", Dec, 2010). These trends show that more and more global consumers are connecting to the Internet via cellular data networks.

Pricing Strategy

To compete with XCOM Global and other portable data services, DataHopper must be less expensive and simpler for the customer to use. We can do this while retaining a high profit. The customer is charged a $10 activation fee when the device is first retrieved at the airport; this fee is required for any period of rental and ensures that the service turns a profit even for extremely short usage periods. After that, a $3 a day rental fee is charged.

The average international traveler stays for about 8 days when flying to the United States. Based upon this number, we expect to make $34 per customer.

Operating Costs

The total operating costs amount to $610,600 per month or $8,800,000 per year. This cost is primarily composed of:

Lease of Vending Machine Space: $490,000/month
Renting space for a vending machine at an airport costs between $5,000 and $7,000. With 70 vending machines at $7,000 each, we expect to spend $490,000 per month on leasing space at JFK, LAX, MIA, ORD, and EWR.

Purchase of Mobile Data: $100,000/month
We will purchase data from mobile service providers and then resell this data via DataHopper devices. This cost was challenging to estimate, as mobile carriers don't advertise rates at this scale; however, based on the sizes and costs of similar mobile data resellers, we expect to spend $100,000 per month on data.

Web Portal: $600/month
The web portal will provide information about the service, billing, and reservation system. This system needs to be highly available and fault-tolerant. After looking at the profiles of companies such as Spotify on the cloud service provider Heroku, a monthly amount of $600 has been allocated for this purpose. Our system needs to be highly available, but does not need to perform any bandwidth or data storage intensive tasks.

Marketing & Advertising: $20,000/month
Marketing will include ads on websites that travelers frequent, such as Travelocity; for example, upon booking an international flight to one of our airports, travelers will be presented with an ad for our service. Additionally, ads for the vending machines will be placed throughout our five target airports.

Employees: $125,000/month
Based on the size and complexity of the service, 10 people will be hired to work full-time on the service. $150,000 has been allocated per employee per year. This includes the base salary as well as taxes, insurance, and office space.

Startup Costs

Becoming fully operational will cost us approximately $3,100,000. These projected one-time costs include:

Vending Machine Design: $1,000,000
The vending machine will be custom-made and requires extensive research and prototyping. Based upon the design costs of similar complex vending machines produced by companies like Zoom Systems and Redbox, we expect to spend $1,000,000 on the initial design.

Vending Machine Production: $210,000
After the initial design is created, 70 machines will be produced at a cost of $3,000 per machine. Again, this estimate is based on the costs of existing vending machines.

Portable Routers: $1,900,000
16,000 DataHopper devices (4G Mifi routers) must be purchased. Based on current market values, we estimate that buying these in bulk will yield a cost of about $120 per device.

Estimated Profit & Break-Even Projections

Based on the customer base, conversion rate, and pricing plan discussed above, the service will make $12 million in profit annually ($1 million in profit monthly) once we are up and running. Keeping in mind our development schedule and the fact that we will not be making money until we are deployed,

this figure puts the overall break-even point towards the end of the third year of operation.

To recover the monthly operating costs of $610,600 with the expected user base (602,000 per year), the service needs to make around $12 per customer to break even.

For more information, see the following appendices:

Appendix F: Value Flow Diagram
A diagram indicating the flow of revenue and value between DataHopper and various stakeholders (data companies, airports, and customers).

Appendix G: Income Statement
An analysis of our costs and projected income for the first three fiscal years.

DataHopper Service Blueprint

Physical Evidence	ad/website	gates, baggage claim, security checkpoints	Wayfinding, vending machine	vending machine, credit card	vending machine, DataHopper device, brochure, chargers	cab, bus, train, car	DataHopper device	DataHopper device, laptop, cellphone	cellphone, laptop	DataHopper device	car charger, wall charger	ticketing, gates, security checkpoints	vending machine
Customer Actions	make reservation	arrive at airport	find DataHopper vending machine	check-in	retrieve DataHopper device	leave airport	turn on DataHopper	connect cell phone(s) & laptops(s) to DataHopper	use DataHopper to access internet	turn off DataHopper	charge DataHopper	arrive at same airport	return DataHopper to vending machine
		LINE OF INTERACTION											
Onstage/ Visible/ Contact Employee Actions				process check-in	dispense DataHopper device		process power on	process login		process turn off	process charging		receive DataHopper device
		LINE OF VISIBILITY											
Backstage/ Invisible/ Hidden Employee Actions	make reservation for customer				physical object is located in machine		DataHopper device seeks connection to data system	DataHopper device connects to data system	DataHopper device connects to data system	DataHopper device disconnects from data system			physical object is stored within machine
		LINE OF INTERNAL INTERACTION											
Support	reservation system			reservation system			data system	data system	data system	data system			registration system

APPENDIX B: WIREFRAMES

logo

list of languages list of languages

a portable internet connection for phones and laptops

Wireframe #1: Home Screen

Learn More	Retrieve Reservation
Rent a DataHopper	Return DataHopper
Help	Change Language adskjf dsk sdk

logo

Wireframe #2: Possible Menu

Wireframe #3a: Low-fidelity "Learn More" Screen

Wireframe #3b: High-fidelity "Learn More" Screen

Retrieve Reservation
Picking up your DataHopper is easy.
First, Dip your credit card in the slot.

credit card — use agreement — dispense device — print receipt

back

| FAQS | Help | home | Change Language |

logo

Wireframe #4: Step 1 in Device/Reservation Pickup Flow

Retrieve Reservation
Next, read our use agreement.

credit card — use agreement — dispense device — print receipt

TERMS AND CONDITIONS
A. ITUNES STORE, MAC APP STORE, APP STORE, AND IBOOKSTORE TERMS OF SALE
B. ITUNES STORE TERMS AND CONDITIONS
C. MAC APP STORE, APP STORE AND IBOOKSTORE TERMS AND CONDITIONS
D. PRIVACY POLICY

THE LEGAL AGREEMENTS SET OUT BELOW GOVERN YOUR USE OF THE ITUNES STORE, MAC APP
STORE, APP STORE, AND IBOOKSTORE SERVICES. TO AGREE TO THESE TERMS, CLICK "AGREE." IF
YOU DO NOT AGREE TO THESE TERMS, DO NOT CLICK "AGREE," AND DO NOT USE THE SERVICES.

A. ITUNES STORE, MAC APP STORE, APP STORE, AND IBOOKSTORE TERMS OF SALE

PAYMENTS, TAXES, AND REFUND POLICY

The iTunes Store, Mac App Store, App Store, and iBookstore services ("Services") accept these forms of payment:
credit cards issued by U.S. banks, payments through your PayPal account, iTunes Cards, iTunes Store Gift Certifi-
cates, Content Codes, and Allowance Account balances. If a credit card or your PayPal account is being used for a
transaction, Apple may obtain preapproval for an amount up to the amount of the order. Billing occurs at the time
of or shortly after your transaction. If you are using 1-Click purchasing or your PayPal account, your order may be
authorized and billed in increments during one purchasing session, so it may appear as multiple orders on your state-

I agree

I do not agree

back

| FAQS | Help | home | Change Language |

logo

Wireframe #5: Step 2 in Device/Reservation Pickup Flow

Retrieve Reservation

credit card   use agreement   dispense device   print receipt

Your DataHopper will pop out the window at right.

I can't find it or it didn't pop out.

I have retrieved my DataHopper.
Take me to the next step.

back

FAQS   Help   home   Change Language   logo

Wireframe #6: Step 3 in Device/Reservation Pickup Flow

Retrieve Reservation

credit card   use agreement   dispense device   print receipt

Retrieve the printed receipt below. Keep is as a reference.
If you would also like a reciept emailed to you, enter your
email adress below.

Finish

email address

submit email address

FAQS   Help   home   Change Language   logo

Wireframe #7: Step 4 in Device/Reservation Pickup Flow

Return Your DataHopper
Returning is easy. Just pop your datahopper in the slot at right.

put in window   check in   report problems   get reciept

Its in the window.   I need help.

FAQS   Help   home   Change Language   logo

Wireframe #7: Device Return Flow

APPENDIX C: VALUE OPPORTUNITY ANALYSIS

		DataHopper	XCOM
Ergonomics	Comfort	Small enough to fit easily into your pocket	
	Safety	yes	
	Ease of use	Easy setup and one-step pickup process; easy to understand billing options; no need to understand technical details	Hard to understand billing options w/ several fees; unknown out-of-box experience; relies on knowledge of Mifi
Identity	Timeliness	Increasing dependence on smartphones and data usage for international travel means perfect time to provide data; focus on cheap solution is perfect for economic recession	Right time, but too expensive in an economic recession
	Sense of place	Right where the travelers are: the airport; can reserve units ahead of time (for planners) or just grab them on the go (impulse users)	Requires extreme planning and prior discovery on behalf of the user, and takes time to ship the device out; inconvenience of shipping it back
	Personality	Vacation, Leisure-like	Corporate
Impact	Social	Allows travelers to connect to their friends/family/new people via internet connection; no longer cut off from the virtual world	
	Environmental	No packaging and recycling of the rental device means no waste; instructional manual made from recycled material	Shipping boxes and material, though questionably recyclable, lead to slightly more waste
Core Technology	Reliable	Mifi units are *always* checked for failure via diagnostics before user gets them; only good devices are rented out; reservations provide a way to ensure for active planners	(unknown; assumed that failure is accounted for upon device return)
	Enabling	Extremely enabling: provides data access for all devices	
Virility	Transmissible	Broadcast on vending machine how many devices are out and about Blue/orange branding is distinctive and recognizable Receipt upon return is a bright and happy THANK-YOU card – very different from normal receipts	
	Evangelical	Referral bonuses via website Print discount cards for future trips for them to give to friends ("Have a friend coming to the US soon, or plan on coming back? We'll waive the pick-up fee for you!")	
	Sustained	Mifi device is only rented, not bought Recognize repeat users; when they swipe their cards, say "Hi Kazimir! Welcome back to the US" etc., and maybe even give surprise discounts for loyalty	Mifi device is only rented, not bought

APPENDIX D: DEPLOYMENT ROADMAP

	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	2012 Q2	2012 Q3	2012 Q4	2013 Q1	2013 Q2	2013 Q3	2013 Q4	2014 Q1
System - Back-end													
System Analysis / Design	Develop												
System Implementation (S/W)		1st Implement											
Implementation Pilot System (S/W & H/W)			1st Pilot										
Testing			1st Test										
Deployment				1st Deploy									
Maintenance													
System - Website (Front-end)													
System Analysis / Design		Develop											
System Implementation		1st Implement											
Implementation Pilot System			1st Pilot										
Unit Testing and Integration Testing			1st Test										
Deployment				1st Deploy									
Maintenance													
System - Kiosk (Front-end)													
System Analysis / Design		Develop											
System Implementation (S/W)		1st Implement											
Additional System Feature Development (S/W)					2nd Implement								
Implementation Pilot System (S/W & H/W)			1st Pilot					2nd Pilot					
Unit Testing and Integration Testing			1st Test					2nd Test					
Partial Deployment				1st Deploy					2nd Deploy				
Full Deployment										Full Deploy			
Maintenance													

APPENDIX E: BLOCK DIAGRAM

APPENDIX F: VALUE FLOW DIAGRAM

space in airport

DataHopper
Business Manager

Total internal monthly cost
(employees, mifis, ads etc)
67,000 per month

Airports
JFK, LAX, MIA
ORD, ERW

$7,000 per vending machine

Data Packets

$100,000 per
month data rental*

$10 activation fee +
$3 per day data usage

Data Service, Convenience, Simple Billing

Data Providers
AT&T Business Manager

Foreign Travelers
(2,163 needed to break even per month
with average of 8 days trip - this is 0.3%
of potential customers)

(59,000 is the max # of
customers possible)

Value

Revenue

APPENDIX G: INCOME STATEMENT

	FY 2011	FY 2012	FY 2013
Sales			
Data Service Charge	$0	$6,144,915	$20,483,048
Total Sales	**$0**	**$6,144,915**	**$20,483,048**
Cost of Sales			
Telecom Infrastructure - MVNO	$0	$1,200,000	$1,200,000
MiFi Router	$1,458,000	$432,000	$0
Kiosk	$210,000	$5,880,000	$5,880,000
Blade Server (back-end & web system)	$15,000	$0	$0
Payroll - Software Development	$320,000	$240,000	$0
Payroll - Software Testing	$35,000	$35,000	$0
Payroll - System Installation	$50,000	$120,000	$0
Vending Machine Research	$1,000,000	$0	$0
Total Cost of Sales	**$3,088,000**	**$7,907,000**	**$7,080,000**
Gross Margin	**-$3,088,000**	**-$1,762,085**	**$13,403,048**
Gross Margin Ratio	N/A	-28.68%	65.43%
Labor Expenses			
Sales / Operation / Others	$1,500,000	$1,500,000	$1,500,000
Total Labor Expenses	$1,500,000	$1,500,000	$1,500,000
Hardware Expenses			
Maintenance	$14,400	$36,000	$36,000
Total Hardware Expenses	$14,400	$36,000	$36,000
Network Expenses			
Server Hosting (Web & Back-End)	$7,200	$7,200	$7,200
T1/T3 Circuit Leasing (Link Kiosks to Back-end)	$6,000	$6,000	$6,000
Maintenance	$0	$0	$0
Total Network Expenses	$13,200	$13,200	$13,200
On-going Support Expenses			
Device Redistribution	$24,000	$24,000	$24,000
Client Support	$200,000	$200,000	$200,000
Total On-going Support Expenses	$224,000	$224,000	$224,000
Marketing Expenses			
Commercial Ads	$240,000	$240,000	$240,000
Total Marketing Expenses	$240,000	$240,000	$240,000
General and Administrative Expense			
Depreciation	$267,300	$349,200	$349,200
Total General and Administrative Expenses	$267,300	$349,200	$349,200

Total Expenses	$1,558,900	$1,662,400	$1,662,400
Profit Before Interest and Taxes	-$4,646,900	-$3,424,485	$11,740,648
Accumulated Profit	-$4,646,900	-$8,071,385	$3,669,263