Survey Solutions:

Infrastructure Maps

December 9, 2014

Survey Solutions Infrastructure Maps

This document outlines a few of the possible configurations of the Survey Solutions system for data collection. Other configurations and combinations of the ones listed here are generally possible, depending on particular circumstances.

Selecting a proper configuration has important consequences in the following dimensions:

- cost
    - fixed investment in the devices and infrastructure;
    - variable costs, most notably cost of 3G traffic and server hosting.
- logistics
    - travel schedule of the interviewers,
    - the need to return to the local office or central office,
    - whether the supervisor travels with the interviewers, etc
- security, or the risks of:
    - intercepting the data circulating in the system;
    - injecting external the data into the system, and
    - other malicious actions, such as destroying the database alltogether.
- availability of data, in other words, how quickly the data collected in the interview appears in the aggregated database.

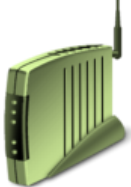The following questions help determine which setup is most appropriate for a particular situation:

1. Is it a mandatory requirement that the server containing the data must reside in the country?
2. If the answer to #1 is 'yes' then is the server connected to the internet and addressable from internet?
3. Are the tablets equipped with 3G connection (usable at will)? For example, they are 3G capable (equipped with a proper GSM module accepting SIM cards), or accompanied by a mobile router with a 3G USB-dongle.
4. Do interviewers have a possibility to return to the central office (where the server is located) for data synchronization?

Choice of the server location

There are several options for hosting the server and a particular choice depends on the valuation of pros and cons by the client according to the following:

Option	Pros	Cons
World Bank's server for testing only (forthcoming)	• free to the client; • client doesn't need to install or update the software;	• located far from client, which may slow down communications;
Global clouds: Amazon AWS, Microsoft Azure, etc.	• possible choice of several locations in different regions; • scalable performance; • client doesn't need to install or update the software;	• paid service, not free to the client; • servers are subject to possible document and data extraction according to the Patriot Act;
Local private cloud	• negotiable terms with local providers; • local company provides maintenance of hardware and equipment; • hosting company complies with local laws and regulations to protect client data;	• paid service; • located close to the client; • client needs to install and update the survey solutions software; • may not be available in all countries;
Self-hosted	• full control of the data, software and hardware; • located near the client, speed depends only on local infrastructure and equipment.	• maintenance of server running 24/7; may require special server room, uninterruptable power supply, and reliable internet connection, and other infrastructure; skilled system administrator and support team; • client is fully responsible for costs of server support.

Legend

	Server with Ethernet network connection and a wireless network card if necessary.		Stationary wireless network router, usually also provides wired capabilities.
	Laptop		Mobile wireless network router, usually equipped with a battery.
	Tablet		3G wireless USB dongle that accepts SIM cards
	Developers/support team		Internet
	Office location		Field team
	Remote location		

Setup 1

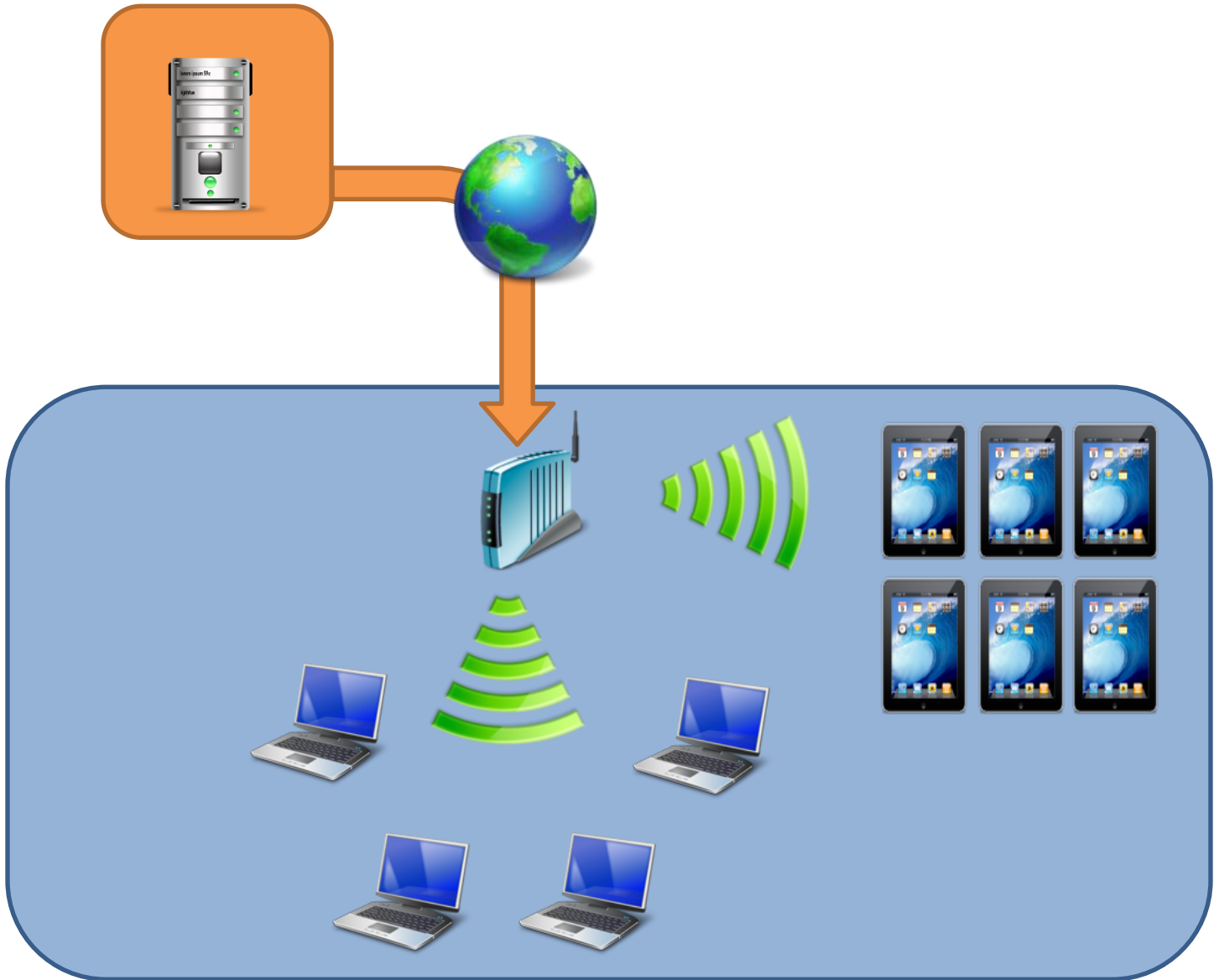| When you may want to use this mode: |
|---|
| You already have a server and network infrastructure, which can be used for hosting the Survey Solutions server application. Your country is not covered completely by wireless data services and international traffic costs are prohibitively large. You want to remain in full control of all the equipment used, while at the same time you can afford delays in data upload and it is an acceptable practice for the interviewers to regularly return to the central office, where the supervisors normally work. All equipment is stationed in one office with a wireless router conducting information between all devices. |

Advantages	Disadvantages
• Mostly fixed cost (infrastructure). • Secure (all exchange of data happens in the same room in controlled environment. • Tablets can be budget models without 3G module.	• Interviewers have to travel to the office to download assignments, upload collected interviews. • Client has to install and maintain equipment and software.

Setup 2

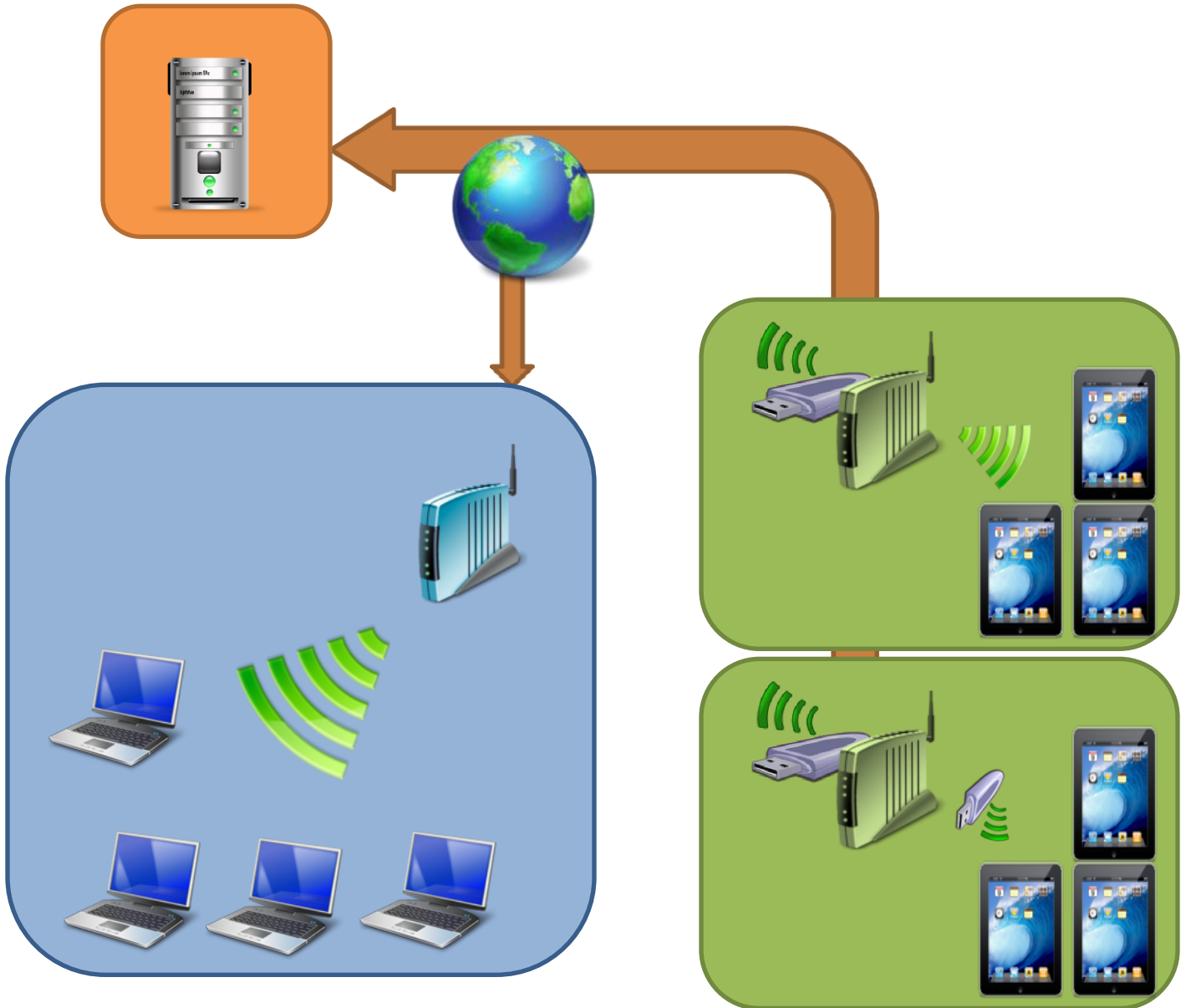| When you may want to use this mode:	
You already have network infrastructure and while your country is not covered completely by wireless data services, there is one or more offices that have high speed connection to the internet. It is an acceptable practice for the interviewers to regularly return to the central or regional office, where the supervisors normally work. The office doesn't possess server equipment and necessary personnel to service and maintain it. The office must only provide internet connection and a wireless router that permits all other devices access the remote server by connecting to it.	
Advantages	**Disadvantages**
• No need to purchase, install, and configure server. • Simpler for the maintenance team to support and provide updates. • Tablets can be budget models without 3G module.	• Data is stored on a remote server. • Internet connection in the office is required to reach the server.

Setup 3

When you may want to use this mode	
Your supervisors stay in the central office most of the time, while the interviewers travel to remote locations in teams unsupervised. The country has a good 3G/4G wireless coverage, which makes it possible to use it to send data from the field to the server through 3G/4G-connection to the internet. Each team can be issued a wireless mobile router.	
Advantages	**Disadvantages**
• No need to purchase, install, and configure server. • Maintenance can be done remotely to configure the system and provide updates. • Teams can send data frequently. • Supervisors can remain in the central office. • Tablets can be budget models without 3G module.	• Data is stored on a remote server. • Internet connection in the office is required to reach the server. • 3G connection is required (1 for each team). • Mobile routers are required (1 for each team).

Setup 4

When you may want to use this mode
When the supervisor is travelling with the team, both the supervisor and the interviewers are utilizing the same connection through 3G-mobile wireless router. The supervisor may remain in control of the wireless router and control all communications from the tablets.

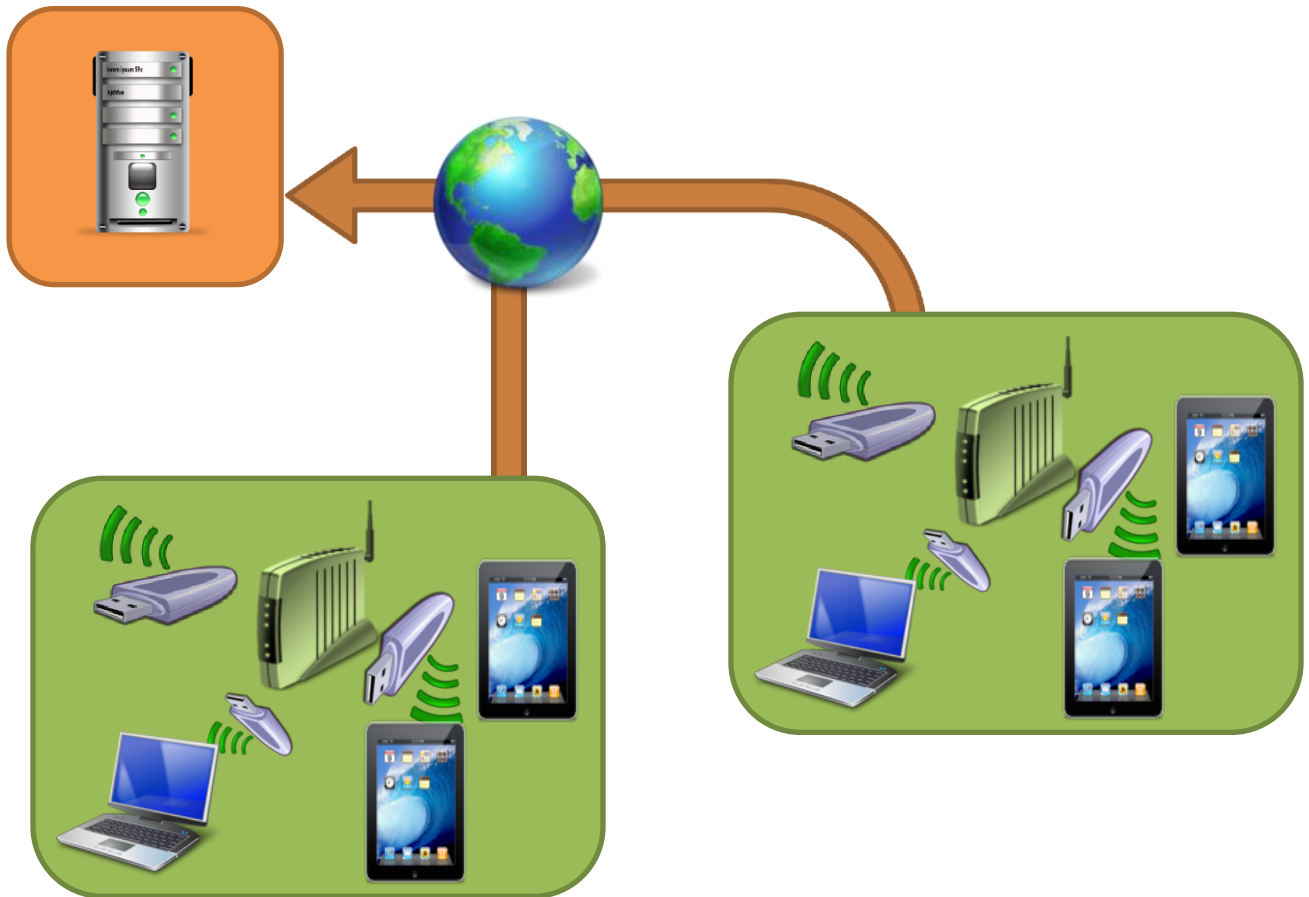| Advantages	Disadvantages
• No need to purchase, install, and configure server. • Maintenance can be done remotely to configure the system and provide updates. • Teams can send data frequently and supervisors can approve or reject in the field when 3G is available. • Tablets can be budget models without 3G module.	• Data is stored on a remote server. • 3G connection is required (1 for each team). • Mobile routers are required (1 for each team). • Supervisors travel with the teams (could also be an advantage).

Setup 5

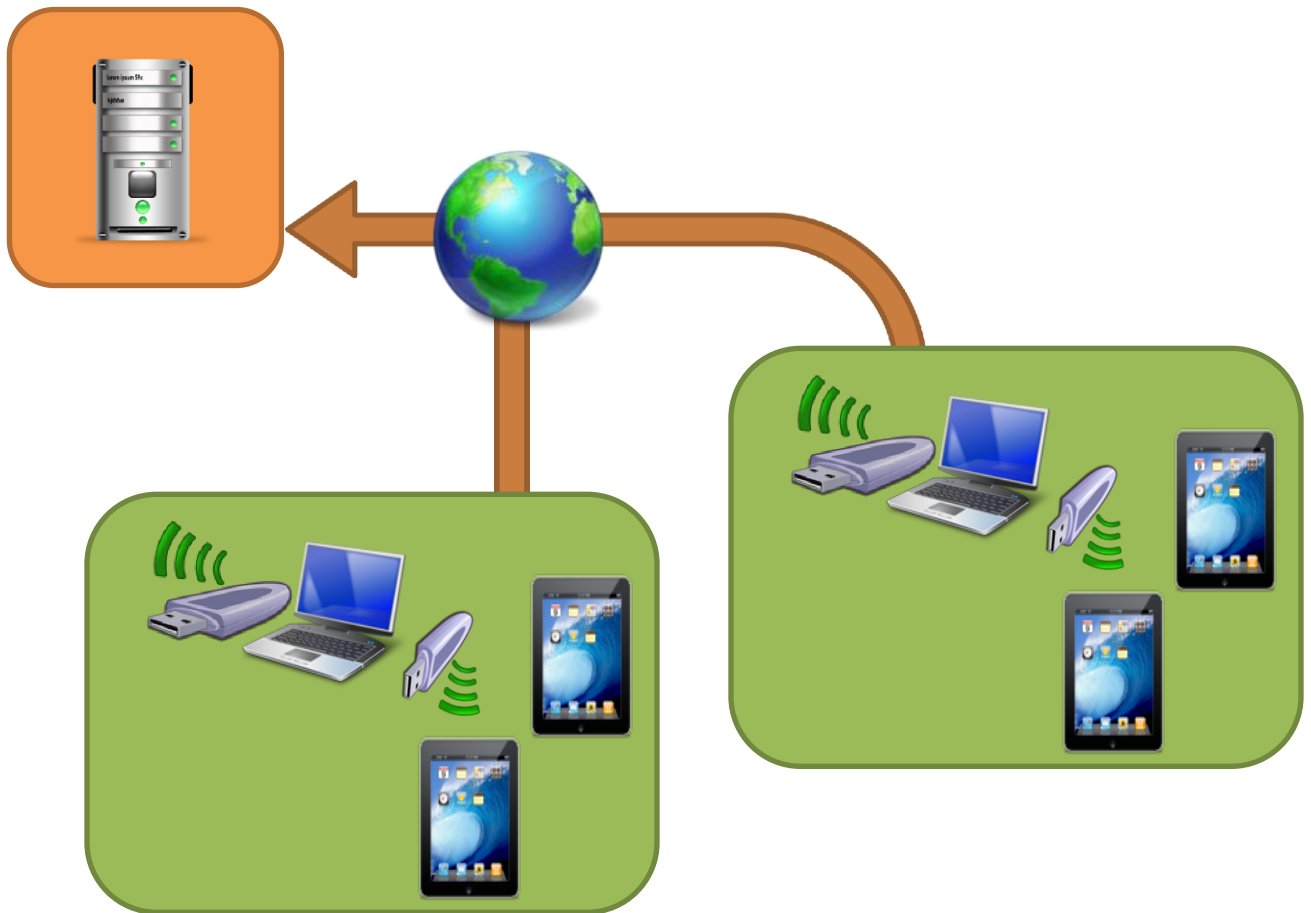| When you may want to use this mode:	
To reduce the amount of equipment involved, this mode allows a set up without 3G-mobile wireless routers. This however requires the presence of supervisors for all interviewers synchronizations in the field (here the supervisor's laptop is substituting for the router in a sense). 3G-mobile connection is required only for the laptop and remains in control of the supervisor.	
Advantages	**Disadvantages**
• No need to purchase, install, and configure server. • Maintenance can be done remotely to configure the system and provide updates. • Teams can work autonomously, send data frequently from the areas where 3G is available, supervisors can approve, reject and comment regardless of 3G availability • No need for mobile routers. • Tablets can be budget models without 3G module.	• Data is stored on a remote server. • 3G connection is required (1 for each team). • Supervisors travel with the teams (could also be an advantage).

Setup 6

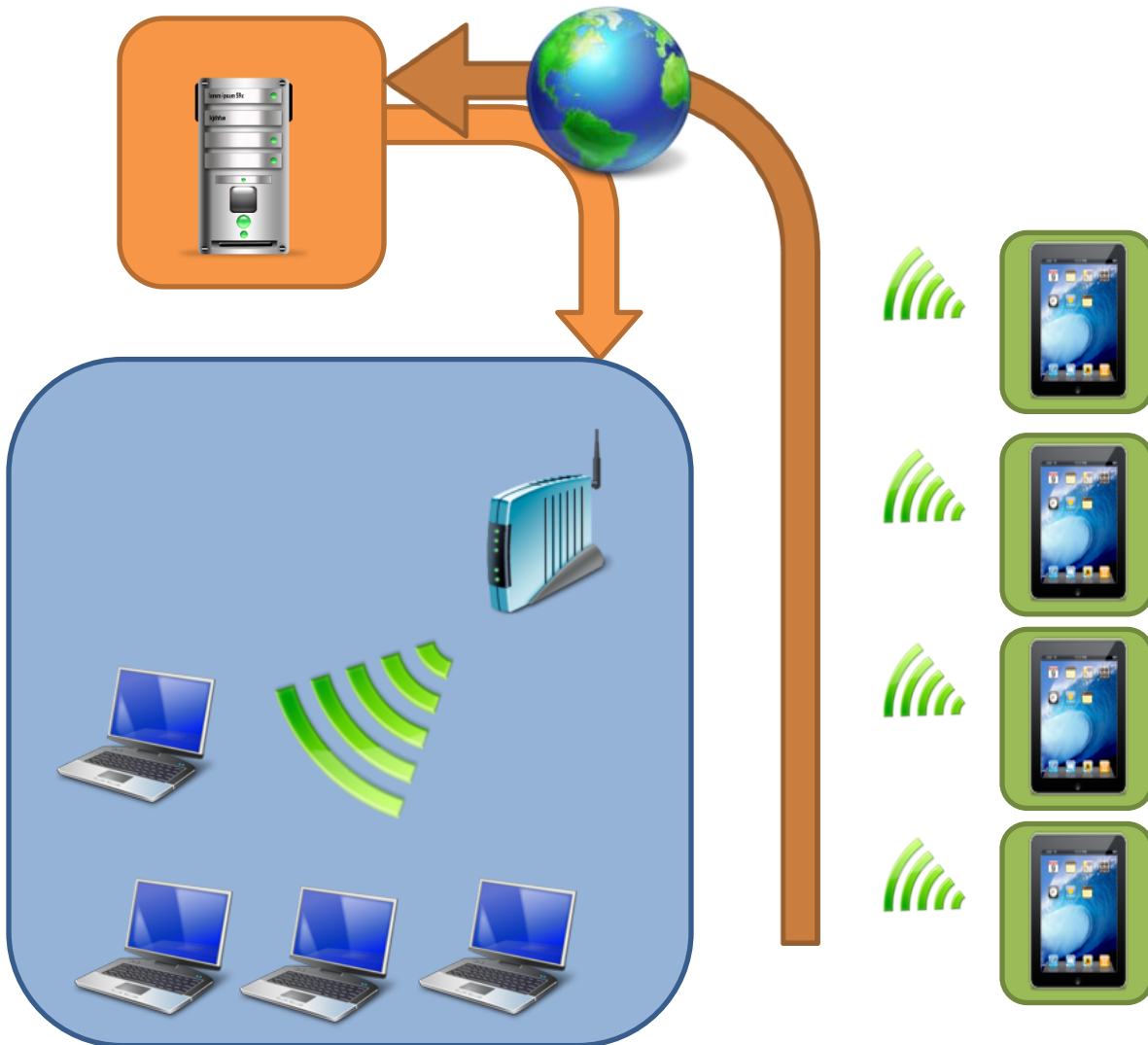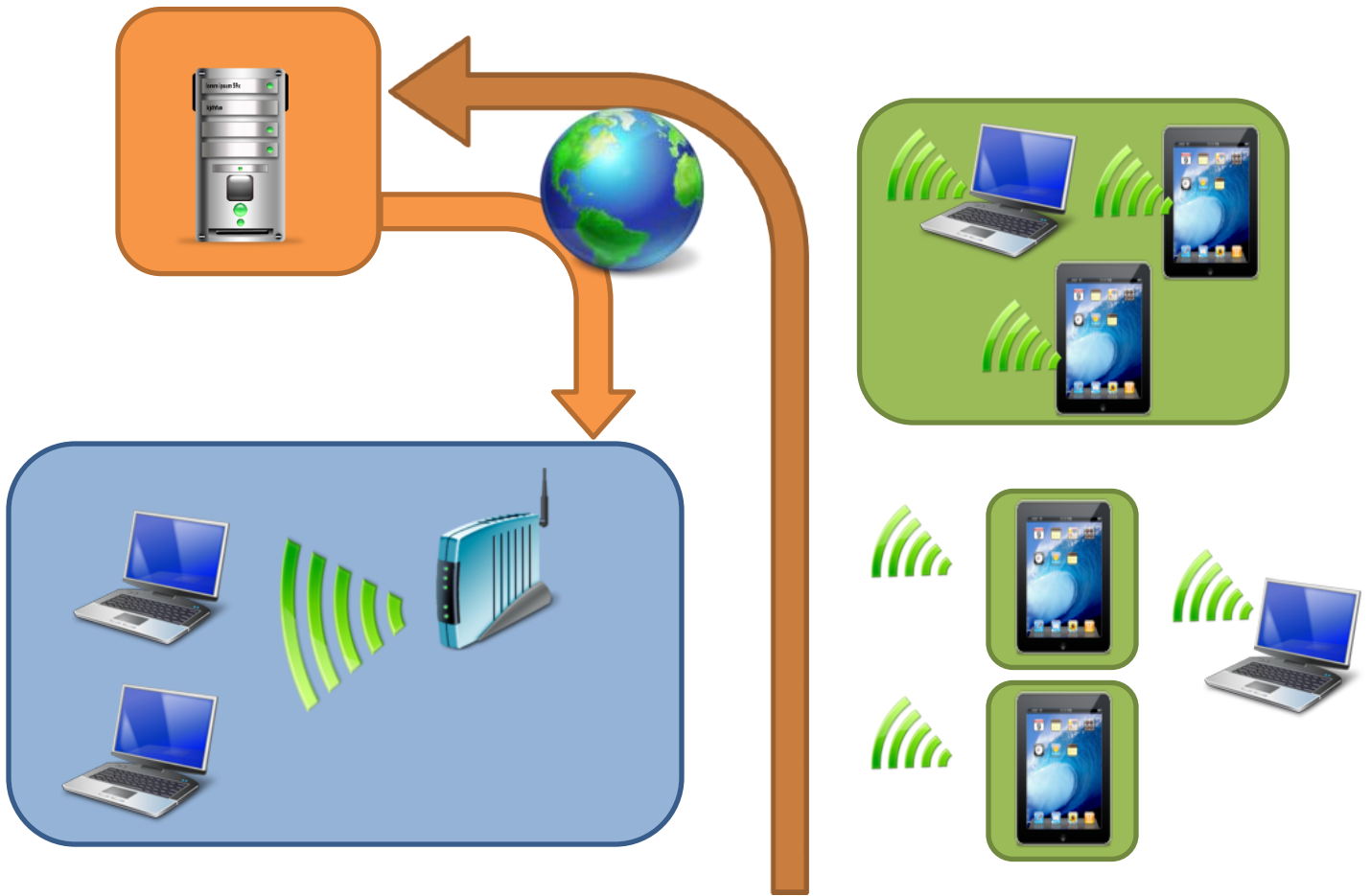| When you may want to use this mode:	
The sampling units are very much distributed geographically so that it is not possible or rational to form teams of interviewers. Interviewers travel independently, relying on the 3G connection to send and receive data using the built-in 3G module. The supervisors are staying in the office and connect to the internet wirelessly or by cable. Only interviewers working in non-covered areas have to travel to the nearest covered location to submit and receive data.	
Advantages	**Disadvantages**
• No need to purchase, install, and configure server. • Maintenance can be done remotely to configure the system and provide updates. • Interviewers work independently and can send data frequently, whenever 3G coverage is available. • Mobile routers are not required. • Supervisors can remain in the central office.	• Data is stored on a remote server. • Internet connection in the office is required to reach the server. • 3G connection is required (1 for each tablet). • Tablets must be equipped with a 3G GSM built-in module (more expensive, fewer models).

Setup 7

When you may want to use this mode:	
There are several surveys running in parallel, and presence of the supervisor in the field is required only for some of the surveys. This mixed mode allows sharing the same cloud server for collection of both surveys, with some supervisors staying in the office and utilizing the office internet connection through a wireless router, while other supervisors travel with their teams or independently.	
Advantages	**Disadvantages**
• No need to purchase, install, and configure server. • Maintenance can be done remotely to configure the system and provide updates. • Interviewers work independently and can send data frequently, whenever 3G coverage is available. • Mobile routers are not required. • Supervisors can remain in the central office.	• Data is stored on a remote server. • Internet connection in the office is required to reach the server. • 3G connection is required (1 for each tablet). • Tablets must be equipped with a 3G GSM built-in module (more expensive, fewer models). • Laptops of travelling supervisors must be equipped with 3G USB dongles.

Setup 8

When you may want to use this mode:	
To achieve full flexibility, and allow the supervisors to decide for themselves whether to travel with interviewers or remain in the office and at the same time allowing frequent updates of the data. 3G-mobile routers can be utilized to provide internet connection to older tablets not equipped with a SIM slot. This mode can be used in the situations when the interviewers normally work independently, but supervisors perform field visits to monitor how the interviews are conducted and there is a need for them to remain connected.	
Advantages	**Disadvantages**
• No need to purchase, install, and configure server. • Maintenance can be done remotely to configure the system and provide updates. • Interviewers work independently and can send data frequently, whenever 3G coverage is available. • Mobile routers are only required when needed. • Supervisors can remain in the central office or travel at will.	• Data is stored on a remote server. • Tablets must be equipped with a 3G GSM built-in module (more expensive, fewer models) or work with a mobile router-3G-dongle pair. • Laptops of travelling supervisors must be equipped with 3G USB dongles. • 3G connection is required for each tablet and laptop.