

Lucent Technologies
Bell Labs Innovations



DEFINITY[®] Wireless Business System
Site Planning

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Issue 4
May 1999

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- Routed to a recorded announcement that can be administered by the CPE user
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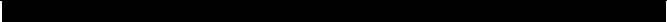
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About This Book

Overview

This document describes the site planning process used by Lucent Technologies to plan a DEFINITY® Wireless Business System (DWBS) installation. It explains how Lucent Technologies representatives survey the customer's facilities and collect the information needed to determine the size and layout of the system.

The following site survey steps are performed before the DWBS is installed.

- **DWBS Customer Profile**—The Lucent Technologies account team representative completes a customer profile about the company's DEFINITY Enterprise Communications Server® (ECS), available power and space, and coverage area needs. (Refer to Chapter 2 of this document for details on the DWBS customer profile.) Once the representative completes the customer profile, an on-site survey is scheduled.



NOTE:

The customer profile does not take the place of conducting an on-site survey.

- **Planning the Site Survey**—A Lucent Technologies representative schedules a site survey visit to the customer's facilities once the customer representative provides a complete set of architectural floor plan drawings.
- **Site Survey**—The Lucent Technologies representative conducts a site survey at the customer's facilities to do the following:
 - Assess and collect the detailed information (for example, wall heights, materials, etc.) about the building
 - Verify the floor plans and necessary coverage areas
 - Indicate potential obstructions to radio transmission

The site survey is performed after the Estimator quote is provided and the customer profile is completed.

The site survey is the responsibility of the Lucent Technologies account team. The site survey can be performed by a wireless champ, design specialist, or project manager. It is recommended that at least two account team members conduct each site survey. This helps expedite the process, and it usually ensures that more details are recorded.

Refer to Chapter 3 of this document for information on conducting a site survey.

Intended Audience

This document is intended for the following users:

- Customer's representative responsible for site preparation
- Lucent Technologies representative from the branch office (for example, a wireless champ, design specialist, or project manager) who is responsible for the on-site survey
- Sales and Design Support Center (SDSC) engineer, who designs the DWBS installations using the Predictor installation tool

Typographic Conventions

The following typographic conventions are used in this book to convey information consistently and quickly.

- *This typeface* is used for references to titles of other information and for emphasis within other typefaces.
- **This typeface** emphasizes key words to help clarify meaning in a sentence or to call attention to a distinction.
- The following note icon identifies additional information pertinent to the text preceding it.

 **NOTE:**

Related Documentation

The following manuals describe the remainder of the DWBS product:

- *DEFINITY Wireless Business System Installation and Test*, 555-232-102 — Provides procedures and information for installing the system.
- *DEFINITY Wireless Business System Maintenance*, 555-232-103 — Provides procedures and information for maintenance of the system.
- *DEFINITY ECS Interface for the DEFINITY Wireless Business System*, 555-232-108 — Explains how the DEFINITY Enterprise Communications Server (ECS) interfaces with the DWBS.
- *DEFINITY Wireless Business System 9601 Wireless Terminal User's Guide*, 555-233-105 — Provides instructions for using the 9601 Wireless Terminal.
- *DEFINITY Wireless Business System 9601 Wireless Terminal Quick Reference*, 555-232-104 — Provides summarized information and quickly accessible commands for using the 9601 Wireless Terminal.
- *DEFINITY Wireless Business System 9630 Series Wireless Terminal User's Guide*, 555-232-701 — Provides instructions for using the 9630 Series Wireless Terminal.
- *DEFINITY Wireless Business System 9630 Series Wireless Terminal Quick Reference*, 555-232-702 — Provides summarized information and quickly accessible commands for using the 9630 Series Wireless Terminal.

Related Information

The Estimator installation tool estimates the amount of DWBS radio infrastructure. The instructions for using this tool are documented in the following:

- *DEFINITY Wireless Business System Estimator*, 555-232-106 — Provides the user with the background and procedural information to install and operate the DWBS Estimator tool.

Document Organization

The remaining chapters in this document are summarized in the following list.

- **Chapter 1, “Product Description,”** presents an overview of the DWBS product.
- **Chapter 2, “DWBS Customer Profile,”** presents and discusses the DWBS customer profile. The profile indicates the wireless needs at the customer site, and it is completed by a Lucent Technologies account team representative.
- **Chapter 3, “Site Survey,”** discusses how the Lucent Technologies account team representative(s) survey(s) the customer’s facilities and gather(s) the necessary information to provide to the SDSC, which in turn engineers the DWBS antenna placement design.
- **Appendix A, “Verifying Estimator Quotes,”** provides a checklist for verifying a DWBS Estimator quote.

The document also contains a glossary and an index.

Product Description

1

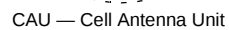
Overview

The DEFINITY Wireless Business System (DWBS) is a wireless communication system that allows the user to communicate through the DEFINITY Enterprise Communications Server[®] (ECS) using pocket-sized wireless telephones. Each wireless telephone is not physically attached to the system, and it can be associated with a specific desk set; therefore, the user can also use it while working at or away from his or her desk. These phones can be used like any other digital extension connected to the DEFINITY ECS. The user can make and receive outside calls, call and receive other extensions, and use DEFINITY ECS features, such as Conference, Transfer, Drop, or Hold.

DWBS Components

The DWBS contains the following components:

- Mobility Manager (MM) software for the DEFINITY ECS
- Radio Controller (RC) circuit packs
- Wireless Fixed Bases (WFBs)
- Cell Antenna Units (CAUs)
- DWBS 9601 or 9630 Series Wireless Terminals (WTs)
- Battery chargers
- Power supplies
- Cables



The system is fully integrated into a DEFINITY ECS; it provides both wired and wireless communications. Radio Controllers (RCs) can be installed into any universal port slot. The wireless subsystem functions, such as Mobility Manager, are fully incorporated into the system.

Mobility Manager

Mobility Manager (MM) is software that executes on the DEFINITY ECS and provides maintenance, administration, and call processing functionality for the DWBS.

DWBS WTs communicate with the system and, at any given instant, via a specific RC. MM directs all control and voice information to the appropriate RC for each WT. In addition, MM is responsible for the administration and some maintenance of the DWBS and WTs.

Radio Controllers

The TN789 RCs are circuit packs that fit into the DEFINITY ECS universal port slots. Each RC connects and controls up to two Wireless Fixed Bases (WFBs) over separate standard twisted pair (I2) interfaces. RCs provide the interface between the DEFINITY ECS and the DWBS network of WFBs. Each RC can handle up to two WFBs.

Wireless Fixed Bases

Wireless Fixed Bases (WFBs) are radio base stations. They provide the radio functions necessary to do the following:

- Transform calls from the DEFINITY ECS into radio signals for transmission through the air to the appropriate DWBS WTs
- Transform radio signals from the WTs into data and to the DEFINITY ECS

Each WFB is connected to:

- An RC by standard twisted pair of up to 5000 ft that uses a proprietary protocol
- One to four CAUs via 100 ft of specially engineered fixed length coaxial cables, called I3 links

A WFB can be connected to a maximum of four (remote) external CAUs. The number of simultaneous calls that can be supported by a WFB with multiple CAUs is 12 minus the number of idle CAUs. In other words, for the WFB to carry 12 calls, each CAU must carry at least one of the calls. However, in high-traffic areas, a WFB is usually connected to just one CAU, which can carry 12 simultaneous calls.

The WFB operates in the 1920 to 1930 MHz band, and it supports up to 12 simultaneous calls. It is a shared resource because any WT can use any WFB; there is not a one-to-one correspondence.

WFBs can be located throughout the customer's premises in a manner that ensures appropriate coverage. WFBs are connected to the RCs by a standard twisted pair (I2) interface up to 5000 cable feet.

For CAUs connected to WFBs, the actual arrangement of the CAUs is determined by the layout of the site as well as the other customer wiring preferences. At a minimum, one antenna must be connected to the WFB. CAUs are connected to the WFB by a coaxial cable (I3) interface. The I3 interface is a connectorized, coaxial cable of 100 feet fixed length and must be provided by Lucent Technologies. The cable is plenum-rated; however, the WFB and CAU are not plenum-rated.

A local standard 48 volt power supply is required whenever the WFB is more than 1000 feet from the RC or when CAUs are used.

⇒ NOTE:

Adding CAUs to the DWBS increases the coverage area. Adding WFBs increases the traffic capacity that the system can handle.

In any given area, antennas from different WFBs can be positioned a minimum of three meters apart when higher traffic density is needed.

Cell Antenna Units

The Cell Antenna Unit (CAU) is a remote antenna that connects to a WFB to expand the coverage area. A maximum of four CAUs can be connected to a single WFB. Each CAU is connected to its associated WFB by a 100 foot I3 coaxial cable, which is a Lucent Technologies proprietary interface.

⇒ NOTE:

The 100 foot distance is not a negotiable number. It is part of the product specification. The 100 foot coaxial cable is a connectorized cable that must be provided by Lucent Technologies. In the future, this cable distance may be subject to change (that is, the fixed length might be increased).

The CAU contains a transmit power amplifier, transmit/receive switch, low-noise amplifier, and antenna. The coaxial cable consists of a center conductor surrounded by an insulator and a grounded shielding material. It provides good resistance to noise. The impedance must match the electronics it connects.

The CAU is much smaller (approximately 5 in x 9 in x 2 in) than the WFB, and it can easily be mounted so that it is not completely visible. CAUs must be mounted inside the building. To provide some coverage outside the building (for example, in parking lots), CAUs may be installed on the inside periphery of the building and face the outside area. However, outside coverage may be minimal in this

configuration. The outdoor CAU (when it becomes available) will provide improved coverage around the outside of the building.

The coverage provided by a CAU is site-dependent in regard to how building materials and location will affect the coverage area.

 NOTE:

The WFB and CAU components are Lucent Technologies white in color and cosmetically compatible with as many decors as possible. Painting these units voids the warranty and maintenance agreements.

WFBs and CAUs cannot be mounted in return air plenums. Any material placed over or around a WFB or CAU may impair coverage of the system.

9601 DEFINITY ECS WT

The DEFINITY ECS 9601 WT is a portable multiple call appearance wireless voice terminal with a display. It is a small (2.5 in x 6 in x 1.1 in), lightweight phone that requires no external antenna.

Features of the 9601 WT include the following:

- Compact, lightweight
- Built-in antenna
- Display screen
- Two lines
- Directory of frequently called names
- Excellent voice quality
- Business features including Conference, Transfer, Hold, and Drop
- Battery charge while call is in progress
- Rapid battery recharge time
- Warning tones and indicators
- Remote firmware update
- Bridging
- Lock

 NOTE:

Refer to the 9601 WT guide for details on these features.

9630 Series DEFINITY ECS WT

The 9630 Series WT is a pocket-size, portable phone that provides wireless mobility as well as access to full business features and many DEFINITY ECS features.

The industrial design of the 9630 Series WT is identical to that of the TransTalk 9031 WT (including no flip). The functionality of the 9630 Series WT is similar to that of the DWBS 9601 WT. The 9630 Series WT is intended for the following markets: manufacturing, distribution, retail, and non-office personnel in health care and other markets.

The DWBS 9630 Series WT provides features and benefits that take the following into account:

- Noisy and relatively inhospitable environments
- "Hands-free" operations
- Durability and reliability



NOTE:

Refer to the 9630 Series WT guide for details on these features and benefits.

Overview

This chapter presents and discusses the DWBS Customer Profile. This profile provides information about the capabilities and needs at the customer site in preparation for a DWBS installation. The first part of this chapter explains each question in the customer profile. This is followed by the profile itself.



NOTE:

The profile does not take the place of conducting a site survey at the customer site.

A Lucent Technologies account team representative should complete the customer profile and send a copy to his or her Lucent Technologies site survey representative. The account team representative should solicit site information from the appropriate customer representative. For a new installation, the account team representative will probably have to get answers to all or most of the questions presented in the profile. For an installation at the site of an established customer, the representative may need to get answers to only a specific set of questions since some information may already exist.

The Lucent Technologies account team site survey representative(s) conduct(s) the site survey after the customer profile is completed and the Estimator quote is provided. Refer to Chapter 3 of this document for guidelines on conducting a site survey at the customer site. Also, refer to the appropriate sales and provisioning process documentation for further details concerning when the site survey is conducted.

Interpreting the Customer Profile

The following sections present and explain the questions that appear on the customer profile.

Available In-House Cable

Are there spare cables or cable pairs that can be used for the DWBS? (Two cable pairs per WFB are required.) When was the cable installed? What is the cable's gauge (22 or 24 AWG), category (3 [minimum] 4, or 5), and type (PVC or plenum, for example)? Who is responsible for installing and documenting the internal wiring? Can circuits that are lightning-protected be identified?

If existing house cable can be used, it may be possible to reduce installation costs and time. However, cable installed before 1987 may not meet Lucent Technologies requirements. The cable's gauge, category, and type determine whether the cable may be used.

Also, Lucent Technologies must know who is responsible for installing and maintaining the company's cable records or documents. The company should be able to assign spare house cable and provide information on the most efficient cable routes.

Telephone Equipment Room

Describe the switch service location in relation to the other buildings where coverage is required. How far from the PBX is the furthest area requiring wireless telephone service?

This information helps determine the best configuration for the customer.

Number of Wireless Telephones

How many employees will be given a wireless telephone? Will there be areas with high wireless voice traffic, including simultaneous calls?

The number of employees with pocket phones and their location affect the equipment requirements since this provides an indication of the required coverage.

Building Information and Coverage Area

Please provide the most accurate and updated complete set of architectural floor plan drawings for the site. Also, provide elevation view drawings (that is, side views), if available. Floor plans should have a scale indication. If not, be sure to provide at least a two-dimension representation of the customer site with accurate dimensions indicated.

These floor plans will be used with the Lucent Technologies Predictor tool to engineer the antenna placement design.

How many separate buildings require DWBS coverage? Are there any areas in the facility where coverage is not desired? Mark these areas on the floor plan.

The building construction and materials will determine the configuration.

Describe the desired coverage areas in detail. If it is not already included in the floor plan, include the actual square footage for each building, floor, etc. Describe the type of the areas that require coverage, such as office areas, shipping docks, manufacturing areas, warehouses, etc. Also, mark if office areas are enclosed or partitioned.

The type of area, coverage requirements, and the size of each area determine the size of the DWBS configuration and its layout.

Building Codes or Restrictions

What building codes or restrictions might affect the installation of the DWBS?

Also, do any of the following constraints come into play?

- *Areas where cable or antennas cannot be installed*



NOTE:

See Chapter 3 for details.

- *Noisy areas*
- *Areas with extreme temperatures*
- *Moving obstacles*

This information will help Lucent Technologies design the cabling.

Customer Profile Form

This section contains the customer profile. A representative from the Lucent Technologies account team is responsible for soliciting information from the customer and answering the questions within the profile. For an established customer, it is probably not necessary to answer every question since some information may already exist.

Once the customer profile has been completed and any additional questions have been resolved, Lucent Technologies will schedule a date for the appropriate representative to visit the customer's facilities. At that time, the representative will tour the facilities, including all equipment rooms, to conduct the site survey.

 NOTE:

All information gathered by Lucent Technologies will be treated as confidential information, and it will not be disclosed to any other party.

Company _____

Address _____

Contact _____

Date _____

Completed By _____

Table 2-1. Available In-House Cable

Questions/Directives	Responses/Comments
<i>Is there spare cable at the customer facilities that can be permanently used for installing the DWBS?</i>	
<i>When was the cable installed?</i>	
<i>What is the cable's gauge (22 or 24 AWG), level (level 2, 3, or 4), and type (PVC or plenum, for example).</i>	
<i>Who is responsible for installing and documenting the internal wiring?</i>	
<i>Can circuits that are lightning-protected be identified?</i>	

Table 2-2. Telephone Equipment Room

Questions/Directives	Responses/Comments
<i>Describe the customer's switch service location in relation to the other buildings where coverage is required.</i>	
<i>How far from the PBX is the furthest area requiring wireless telephone service?</i>	

Table 2-3. Number of Wireless Telephones

Questions/Directives	Responses/Comments
<i>How many employees will be given a wireless telephone? Will there be areas with high wireless voice traffic, including simultaneous calls?</i>	

Table 2-4. Building Information and Coverage Area

Questions/Directives	Responses/Comments
<i>Please provide your most accurate and updated complete set of architectural floor plan drawings for all areas of the building requiring coverage. Also, provide elevation view drawings (that is, side views), if available. Floor plans should have a scale indication.</i>	
<i>How many separate buildings will require DWBS coverage?</i>	
<i>Are there any areas in the facility where coverage is not desired? Mark these areas on the floor plans.</i>	
<i>Describe the desired coverage areas in detail. Include the actual square footage for each building, floor, etc. Describe the type of areas that require coverage, such as office areas, shipping docks, manufacturing areas, warehouses, etc. Also, identify office areas as enclosed or partitioned.</i>	
IMPORTANT: <i>Please mark any changes or additions that have been made to the building and are not shown on the floor plans.</i>	

Table 2-5. Building Codes or Restrictions

Questions/Directives	Responses/Comments
<i>What building codes or restrictions might affect the installation of the DWBS? For example, must Teflon/Plenum-rated cable be used.</i>	
<i>Are there areas where cable or antennas cannot be installed? If yes, please mark them on the floor plans.</i>	
<i>Are there noisy areas in the building? If so, mark these areas on the floor plans.</i>	
<i>Are there areas with extreme temperature changes? If so, mark these areas on the floor plans.</i>	
<i>Are there areas with moving obstacles? If yes, please mark on floor plans.</i>	

Overview

The purpose of the site survey is to collect the detailed information required to engineer the customer's antenna placement. Much of this data is needed so that the customer site can be designed in three dimension (3-D) format. Collecting complete and accurate data produces a high-quality design for the customer site.

The on-site survey is the responsibility of the Lucent Technologies account team. The site survey is conducted to allow the account team representative to fill in the third dimension. Specifically, the survey is conducted to collect all the vertical (or height) measurements, as well as to indicate the material of all the walls, partitions, etc. Obstructions and all their 3-D measurements, as indicated within the checklists in this chapter, must also be recorded.

The Lucent Technologies account team representative schedules and conducts a site survey once the Estimator quote is provided, the customer profile is completed, and a complete set of architectural floor plan drawings for all buildings requiring coverage is received. *The representative can be a project manager, a design specialist, or a wireless champ.*

NOTE:

It is recommended that at least two of these people conduct the site survey. This will expedite the process and ensure that all the required data is recorded. (Generally, two people will collect more details than one person.)

The information gathered prior to the survey via the customer profile helps the representative in completing the survey quickly and efficiently.

In addition to the Lucent Technologies account team representative, the following people should be present at the site survey:

- **DEFINITY ECS Manager** (this person should have knowledge of telephone traffic patterns within the facilities and information about the DEFINITY ECS)
- **Building/Facilities Manager or Engineer** (this person is usually very knowledgeable about the building construction and materials and is therefore critical to a successful site survey)



NOTE:

The Lucent Technologies account team representative should also record the name and telephone number of the building/facilities manager or engineer and provide this information to the SDSC for follow-up questions and comments.

Site Survey Checklists

An on-site survey is required to ensure the accuracy of the customer's floor plan and to obtain details about information provided in the floor plan. Such information includes wall materials and heights, significant obstructions to radio transmission at the customer's site, etc.

The Predictor tool, which is used by the SDSC to determine optimal antenna placement, uses a floor plan of the customer's site as input. The height and material content of walls and obstructions affect the size of the area that can be covered by a single antenna. It is very important to identify correctly and describe walls, tall shelving, massive machinery, and other obstructions so that accurate information can be obtained for the Predictor tool.



NOTE:

Be sure to record appropriate notes on the Site Survey form whenever this is indicated in the instructions within the following checklists. The form appears on the last page of this chapter. Also, remember that the information recorded on the Site Survey form relates back to the floor plan; therefore, this information must be correlated as such.

However, whenever you are actually on site performing the site survey, do whatever is most practical for you based on the scenario. For example, you may find it easier to make some notes directly on the floor plan as you are walking through the site. These notes can be transferred later to the Site Survey forms. Highlighter pens may also be useful to mark global characteristics. For example, all sheetrock walls can be highlighted in blue, and a note indicating this convention can be included on the floor plan. The important thing is to create a style that is comfortable for you while you are on site and then transfer notes, as appropriate.

Once the on-site survey is completed, the following must be provided to the SDSC:

- All the detailed site survey information
- Complete set of architectural floor plan drawings, including any notes or markings from the site survey, and elevation drawings (that is, side views), if available
- Completed site survey forms with information obtained from the on-site survey
- Interior and exterior pictures of the site with the content of the pictures noted
- Verified Estimator output (which may or may not have changed)

Verify the Estimator output against the information in Appendix A. Then send the Design Center Output sheets to the SDSC. The SDSC will use all of this data as input to the Predictor tool to create a 3-D model of the site to engineer the customer's antenna placement design.

Site Visit Preparation

The following table contains the checklist for site visit preparation.

Table 3-1. Checklist for Site Visit Preparation

Activity	Completed (Y/N)
Obtain a complete set of architectural floor plan drawings for all areas of the building requiring coverage. Obtain elevation view drawings (that is, side views), if available. (These drawings show height measurements and materials.) Also, indicate the type of building environment (for example, office, factory, retail store, warehouse, etc.). (Building sketches do not provide sufficient detail.)	
Become familiar with the floor plan. (This prepares you to spot inconsistencies between the floor plan and the site. It also helps you plan your visit. Note areas where you have questions.) During the site survey, mark any corrections on the floor plan.	
Obtain the Estimator output. Compare the Input by Section sheet to the floor plan. <i>Identify on the floor plan the sections described on the sheets.</i> NOTE: For further verification, refer to Appendix A.	
As an option, do some preliminary marking of copies of the floor plan and site survey forms before visiting the site. (The Site Survey form uses a room and label scheme to identify areas of the floor plans. The corresponding rooms and labels must be marked on the floor plan.)	

Required Tools and Documents

You must bring to the site the tools and documents identified in the following list.

Table 3-2. Checklist for Required Tools and Document

Tool or Document	Y/N
Complete set of architectural floor plan drawings, as indicated in the previous checklist. NOTE: A reduced-size copy of the floor plan is easier to carry. However, the floor plan should be large enough to allow note taking.	
Measuring devices (tape measure and electronic distance measuring device) NOTE: A tape measure is sufficient for measuring most distances between various points. However, an electronic distance measuring device, such as a SONIN 60 PRO, is highly recommended for measuring ceiling heights, especially for high ceilings. This electronic device is an off-the-shelf item that can be purchased in a hardware or home improvement store, and it costs about \$50.00.	
Camera	
Copy of the Estimator output	
Site survey forms NOTE: Bring many copies for recording data.	
Clipboard (useful for carrying sheets of paper)	

Basic Site Activities

Once you are at the site, label the floor plan and update the survey forms with the information you gather during your site visit. Remember, you are the eyes and ears of the SDSC. **The SDSC engineers need the detailed information you gather as input to the Predictor tool to create a 3-D model of the customer's site to engineer the antenna placement design successfully.** No one from the SDSC will be present at the site; therefore, it is your responsibility to tell the SDSC engineer everything you have observed.

Table 3-3. Checklist for Basic Site Activities

Activity	Completed (Y/N)
Take many pictures of the site and mark the current location; also, note on the floor plan in what direction the camera was pointed when the pictures were taken. Once the pictures are developed, record the picture content on the back of each picture. NOTE: Both interior and exterior pictures are needed.	
Check the Estimator output—and especially the Input by Section sheet—to ensure that what is being observed and heard from the customer corresponds to what was included in the site estimate. If there are inconsistencies, resolve them or have them resolved before the antenna design and DWBS installation are completed. NOTE: For further verification, refer to Appendix A.	
Label the floor plan and update the survey forms and all floor plans with all the information gathered during the site visit.	
Observe areas of the site that are difficult to cover (including rooms with a lot of metal and/or heavy machinery) and make the appropriate notes. In this regard, be sure to have a good understanding of current DWBS capabilities.	

Discussion Points with the Telecommunications Manager

The following table contains the checklist for discussion points with the telecommunications manager.

Table 3-4. Checklist for Discussion Points with the Telecommunications Manager

Discussion Points	Completed (Y/N)/ Findings
Confirm site areas for wireless coverage, and record this information.	
Confirm whether multiple buildings are supported by remote Expansion Port Networks (EPNs). Also, confirm whether the EPNs are remote fiber EPNs.	
Confirm whether there are installation restrictions regarding antenna mounting (for example, antennas are usually not wanted in patients' rooms in hospitals). Note any antenna-mounting restrictions caused by architectural details, decorative facades, large lighting fixtures, etc. Also, confirm whether there are any restrictions affecting how the cables can be run (for example, obstacles).	

Observation Points and Discussions with the Building Engineer

The following table contains the checklist for observation points and discussions with the building engineer during the on-site survey.

Table 3-5. Checklist for Observation Points and Discussions with the Building Engineer

Observation Points and Discussions	Completed (Y/N)/Findings
While walking through the site, check the floor plan for accuracy. Note any new or missing obstructions on the floor plan. Also, note if something has changed or been removed.	
Take many pictures of the site, especially of any unusual building features that are not easy to explain (for example, atriums, mechanical areas, equipment, machinery, tall shelving, and unique architectural details).	
Observe any global characteristics of the site and enter relevant notes onto the Site Survey form. Specifically, whenever possible, use global statements to describe the building. For example, if all the exterior walls are made of concrete, just indicate this instead of labeling every exterior wall. Also, for example, if ceiling heights in rooms differ from ceiling heights in halls, indicate this difference instead of marking every appearance on the floor plan. For rows of shelving, pillars, machinery, etc., note the number of each row type, its height and width, and the width of the aisles between the rows. This is especially important if this is not shown on the floor plan. Use global statements when possible. For example: “All shelves are 18 ft tall and five ft wide, and the width of the aisles between the rows of shelves is six ft.” Also indicate what is stacked on the shelves. For windows, note the distance between the floor and each window as well as each window’s height. Also, ensure that you can identify windows on the floor plan. If not, mark the location and width of each window. Finally, note the distance between the top of each window and the ceiling. Use global statements when possible. For example, if all or some windows have the same dimensions, simply indicate this, record the dimensions once, and note only the exceptions.	

Table 3-5. Checklist for Observation Points and Discussions with the Building Engineer (continued)

Observation Points and Discussions	Completed (Y/N)/Findings
Verify the drawing scale on each floor plan page by measuring the distance between two points. Record this distance on the floor plan page. The distance between the two points should be the greatest measurable distance possible on each page. Keep in mind that in a floor plan page that is reduced in size, the length of the page may be reduced by a different percentage than the width of the page, or vice versa. Therefore, it is recommended that the distance measurements be taken for each page to account for both dimensions of the page. NOTE: Recording these measurements on each floor plan page enables the SDSC engineer to fill in the rest of the 2-D measurements for everything shown on the floor plan. The site survey is conducted to allow the account team representative to fill in the third dimension. Specifically, the survey is conducted to collect all the vertical (or height) measurements, as well as to indicate the material of all the walls, partitions, etc. Obstructions and all their 3-D measurements, as indicated later in this checklist, must also be recorded.	
Note on the Site Survey form the height of the walls and ceilings. All relevant vertical dimensions must be supplied so that the SDSC engineer can create a 3-D model of the customer site.	
Note the types of material used to construct the ceilings and walls including, but not limited to, the following: concrete, cinder block, metal, wood, glass, and sheetrock (which is also known as drywall or plasterboard).	

Table 3-5. Checklist for Observation Points and Discussions with the Building Engineer (continued)

Observation Points and Discussions	Completed (Y/N)/Findings
Note on the Site Survey form any other significant obstructions, such as shelving, columns, machinery, large computer equipment, and cubicle partitions. For each obstruction, note the type of material, content, location, height, and width on the survey forms. Also, note whether the obstructions are organized in rows or columns and, if so, indicate the number of rows or columns and the direction thereof in the floor plan. For row arrangements, indicate the width of each aisle bounded by two rows. NOTE: Most furniture pieces with a height of less than five feet, such as desks and tables, are not considered obstructions.	
Note on the Site Survey form the window height and the distance between the window and the floor. Also, note the distance from the top of the window to the ceiling. Finally, identify the type of glass (for example, clear, smoked, reflective, etc.) and its dimensions. Use global descriptions to minimize note taking in cases where the windows are the same throughout the building.	
Check the ceilings. If the ceiling is a dropped ceiling, note the distance between the dropped ceiling and the next floor, as well as the type of clutter in the dropped ceiling. NOTE: The building engineer can usually provide this information. Also, open atriums may provide a perfect cut-away view of multiple story buildings; they also allow for a simple measurement from the dropped ceiling to the floor above. If the ceiling is slanted, note the direction of the slant and the height of the peak. Also, note any clutter and girding, along with the type of material. If there is clutter, such as pipes or wiring, measure where the clutter starts and note this on the Site Survey form (for example, clutter starts three feet below the ceiling).	
Mark the wiring closets, switchrooms, and telephone equipment rooms on the floor plan. NOTE: This information may affect WFB locations. Also, note whether there are any restrictions affecting how the cables can be run (for example, obstacles).	

Table 3-5. Checklist for Observation Points and Discussions with the Building Engineer *(continued)*

Observation Points and Discussions	Completed (Y/N)/Findings
Note the stairwells, elevators, and all rooms (for example, offices, computer rooms, etc.) on the floor plan. Note all rooms with a brief description (for example, cafeteria, conference room, office, studio, etc.). This may prompt the SDSC engineer to ask more specific questions about a problem area.	
Determine if there are extreme temperature conditions.	
Note whether the site is a noisy environment. Accordingly, determine whether it will be possible to hear a pocket phone ring and also to have a conversation without using a telephone.	
Before sending the marked floor plans and site survey forms to the SDSC, ensure that these documents are readable and understandable. If there are fragmented floor plans, be sure to note the order in which they should be read and mark how they "fit together."	

Site Survey Example 1: Hospital

For this example, a simplified floor plan drawing for a hospital is being used. The drawing has been reduced in size, and it contains section codes, which are explained on the Site Survey form. The site surveyor will use the architectural floor plans to conduct the site survey.

The surveyed area has a length of 132 ft and a width of 120 ft. The floor elevation is 11 ft for the entire wing of the hospital.

The simplified hospital floor plan appears as follows:

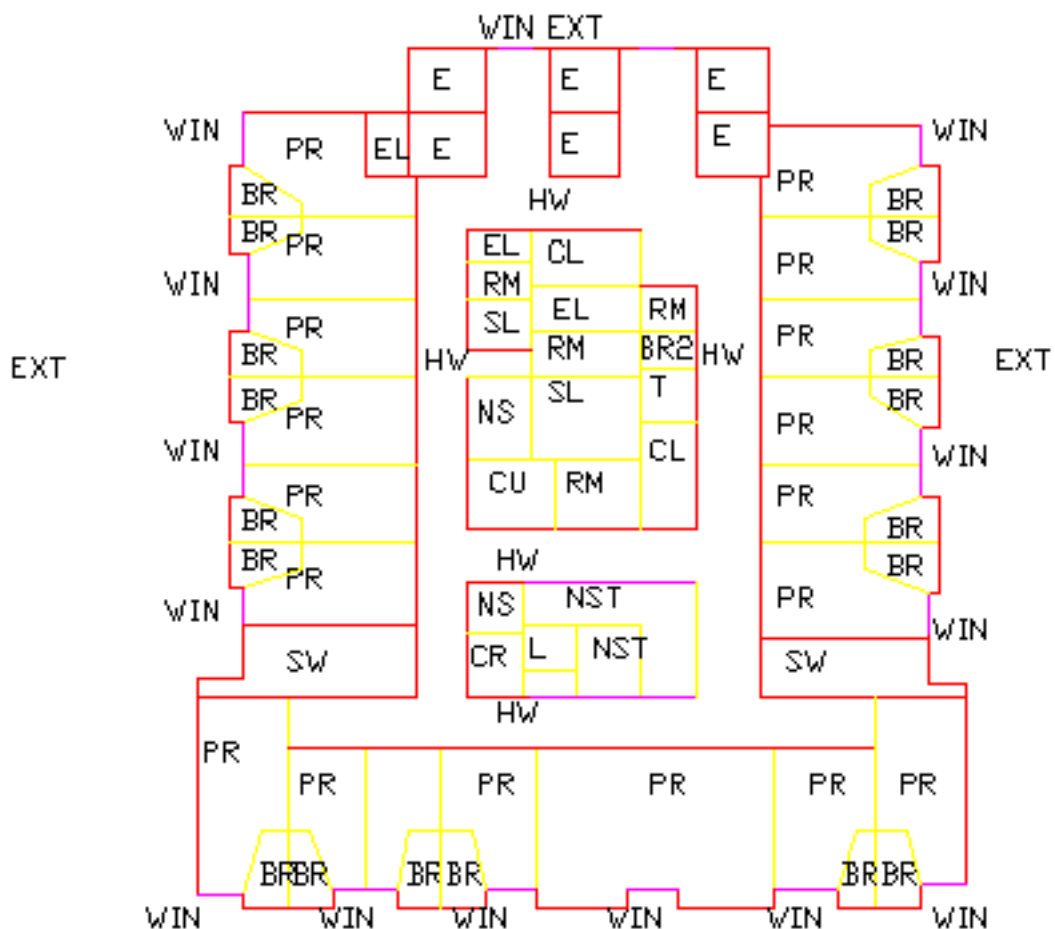


Figure 3-1. Simplified Hospital Floor Plan

The following pages contain a completed site survey form for this example.

Site Survey Form

Page 1 of 4

Location: General Hospital

Date: September 1, 1999

Room	Label	Description	Material	Height
exterior	EXT/WIN	exterior facade	cinder block and glass	3 ft cinder block; 6 ft glass; 2 ft cinder block above glass windows. All windows are noted WIN on the file.
elevator	E	elevators	metal	11 ft
electrical closet	EL	electrical closet	interior walls—sheetrock	8 ft

Site Survey Form

Page 2 of 4

Location: General Hospital

Date: September 1, 1999

Room	Label	Description	Material	Height
patient rooms	PR	patient rooms	interior walls— sheetrock, except for walls that surround stairwells	Drop ceiling starts at 9 ft.
bathrooms	BR & BR2 & T	bathrooms	interior walls— tile over sheetrock	Drop ceiling starts at 9 ft for rooms labeled BR. Drop ceiling starts at 8 ft for rooms labeled BR2 & T.
hallways	HW	hallway	interior walls— sheetrock	Drop ceiling starts at 8 ft.

Site Survey Form**Page 3 of 4****Location: General Hospital****Date: September 1, 1999**

Room	Label	Description	Material	Height
stairwells	SW	stairwells	interior walls— firewall	Drop ceiling starts at 8 ft.
soil linen	SL	soil linen	interior walls— sheetrock, except the wall that runs parallel to SU. This wall is cinder block.	Drop ceiling starts at 8 ft.
rooms	RM & NS & CU & L & FT & CR	room	interior walls— sheetrock	Drop ceiling starts at 8 ft.

Site Survey Form

Page 4 of 4

Location: General Hospital

Date: September 1, 1999

Room	Label	Description	Material	Height
nursing station	NST	nursing station	Interior walls facing corridor are glass windows.	3 ft sheetrock, 4 ft glass, and 1 ft sheetrock. Drop ceiling starts at 8 ft.
rooftop	RT	roof	concrete	rooftop at elevation: 11 ft.

Site Survey Example 2: Factory/Office

For this example, a simplified floor plan drawing for a factory/office is being used. The drawing has been reduced in size, and it contains section codes, which are explained on the Site Survey form. The site surveyor will use the architectural floor plans to conduct the site survey.

The length of the area starting from the southwest end of the drawing to the northwest end is 250 ft. The width of the area starting from the west end to the east end is 630 ft. Except where noted, all drop ceilings start at 12 ft, and the concrete roof starts at 24 ft. The square blocks on the drawing indicate machinery.

The simplified factory/office floor plan appears as follows:

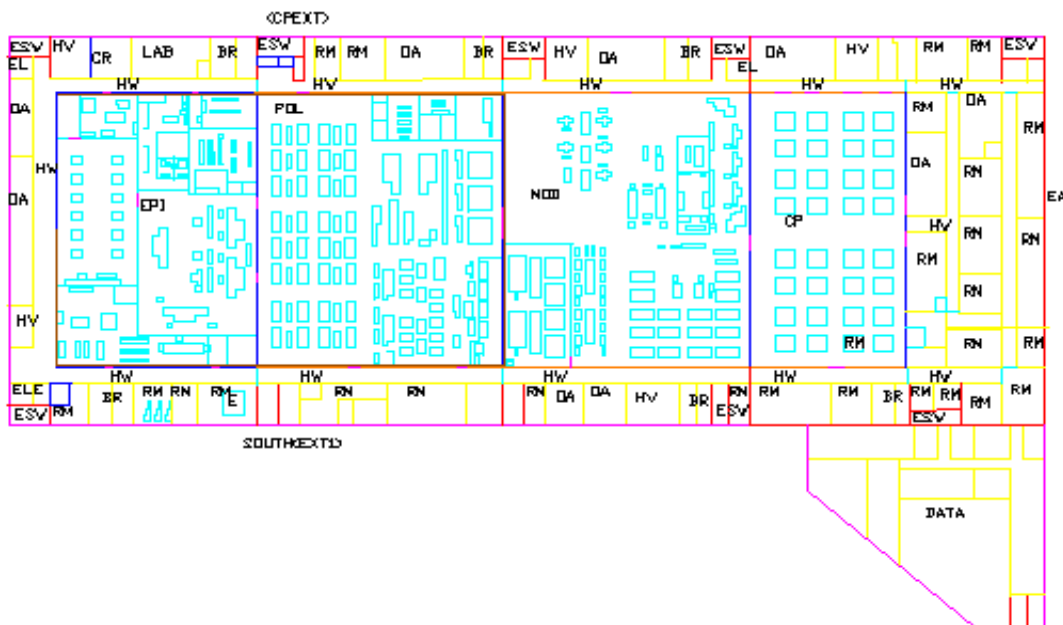


Figure 3-2. Simplified Factory/Office Floor Plan

The following pages contain a completed site survey form for this example.

Site Survey Form

Page 1 of 6

Date: September 1, 1999

Location: Wilmont Factory/Office

Room	Label	Description	Material	Height
exterior	EXT1	exterior facade of 2nd floor (north, west, south)	concrete and glass	0-3 ft concrete; 3-10 ft glass windows; 10-14 ft concrete.
exterior	EXT2	exterior facade of 2nd floor	concrete	0-48 ft
exterior	EXT3	exterior facade of 2nd floor data center (east wall)	concrete	0-24 ft

Site Survey Form**Page 2 of 6****Location: Wilmont Factory/Office****Date: September 1, 1999**

Room	Label	Description	Material	Height
exterior	CPEXT	exterior facade of the CP section	concrete/glass	north side: 0-3 ft concrete; 3-10 ft glass; 10-17 ft concrete; 27-34 ft glass.
EPI	EPI	EPI laboratory	Interior walls (i.e., walls surrounding the corridor) are solid metal. Interior walls are metal; metal machinery.	solid metal walls 0-24 ft; metal partitions 0-10 ft; drop ceiling 10 ft; metal machinery: 5 ft; metal roof 24 ft; raised metal floor: 2 ft.
POL	POL	POL laboratory	Interior walls are solid metal, except walls bordering the hallway; interior partitions are metal.	solid metal walls (running parallel to other labs): 0-24 ft; interior walls metal: 0-12 ft; 2 ft raised floor; drop ceiling 12 ft; metal machinery 5 ft; metal roof 24 ft.

Site Survey Form**Page 3 of 6****Location: Wilmont Factory/Office****Date: September 1, 1999**

Room	Label	Description	Material	Height
MOD	MOD	MOD laboratory	Interior walls are solid metal, except walls bordering the hallways; these walls are sheetrock.	solid metal walls 0-24 ft; hallway walls 0-24 ft; drop ceiling 15 ft; metal machinery 5 ft; metal roof 24 ft.
CP	CP	CP laboratory	Interior walls are solid metal, except walls bordering the hallways; these walls are sheetrock.	solid metal walls 0-48 ft; hallway walls 0-48 ft; drop ceiling 36 ft; metal machinery 15 ft high, 7 ft wide; 11 ft between the aisles; metal roof 48 ft.
stairwells	ESW	exterior stairwells	Interior walls: firewall.	0-12 ft

Site Survey Form

Page 4 of 6

Location: Wilmont Factory/Office

Date: September 1, 1999

Room	Label	Description	Material	Height
electrical closet	EL	electrical closet	Interior walls are sheetrock.	0-12 ft
HVAC	HV	HVAC room; air ducts, etc.	Interior walls are sheetrock.	0-12 ft
bathrooms	BR	bathrooms	Interior walls are sheetrock.	0-12 ft

Site Survey Form

Page 5 of 6

Location: Wilmont Factory/Office

Date: September 1, 1999

Room	Label	Description	Material	Height
office areas and rooms	OA/RM	office areas and rooms	Interior walls are sheetrock.	0-12 ft
elevators	EL	elevator	Interior walls are metal.	0-24 ft; 0-48 ft (CP area)
hallways	HW2	hallway CP area	Interior walls are sheetrock.	0-12 ft (except border of lab room); drop ceiling 12 ft; concrete roof 24 ft; drop ceiling 36 ft; concrete roof 48 ft.

Site Survey Form**Page 6 of 6****Location: Wilmont Factory/Office****Date: September 1, 1999**

Room	Label	Description	Material	Height
hallways	HW	hallways	Interior walls are sheetrock.	0-12 ft (except border of lab room); drop ceiling 12 ft; concrete roof 24 ft.
doorways	EW	doorways in the hallways that divide the lab sections north/side	metal doors	0-12 ft
data center	data	data center	Interior walls are sheetrock.	0-12 ft; drop ceiling 12 ft; concrete roof 24 ft.

Site Survey Form

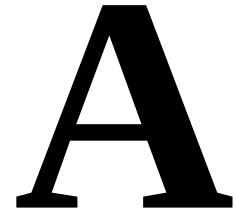
Page ____ of ____

Location: _____

Date: _____

Room	Label	Description	Material	Height

Verifying Estimator Quotes



Overview

This appendix provides a checklist for verifying a DWBS Estimator quote. The checklist should be used by the account team representative who is conducting the site survey to verify the accuracy of the quote whenever the site is being observed and surveyed in more detail. If discrepancies or inaccuracies are observed, this is an opportunity for the account team representative to make adjustments to the initial estimate quote, or to send the estimate quote back to the original account representative who supplied the quote to make the adjustments.

The accuracy of the Estimator quote depends on the accuracy of the input data. The Estimator Verification checklist in the next section contains items for determining whether or not the quote provided to the customer is reasonable and accurate. If the answer to any of the questions in the checklist is "no," the Estimator quote may be inaccurate. Therefore, the quote should be revisited. Whenever you are revisiting the quote, take into account the additional information discovered as a result of stepping through the Estimator Verification checklist.

Estimator Verification Checklist

The following table contains the Estimator Verification checklist.

Table A-1. Estimator Verification Checklist

Item	Y/N
Is the account representative who provided the Estimator quote approved?	
Is the Estimator output generated from the latest approved Estimator release? Specifically, the following five SDSC output work sheets are required: Coverage Summary, Traffic Summary, Input by Section, Design Center Information, and Radio Propagation.	
<i>Examine the Coverage Summary and Traffic Summary work sheets.</i> Is it clear which Estimator quote was provided to the customer (that is, coverage or traffic)? Are the wireless capacities (including RCs, WFBs, CAUs, and pocket phones) in alignment with the stipulated capacities for the current product offer? Are all the necessary additional items (including power supplies, battery chargers, battery packs, etc.) accounted for in the Estimator quote? Is the WiSE engineering fee accurate?	

Table A-1. Estimator Verification Checklist (continued)

Item	Y/N
<i>Examine the Input by Section work sheet.</i> Are all the areas requiring coverage at the customer site accounted for on the Input By Section work sheet? Are all the dimensions used for each section accurate? (Verify this against the architectural floor plans.) Determine if the sectionalizing was done properly. Take into account the following: per-building sectionalizing; per-floor sectionalizing; division of wings; isolating areas completely surrounded by the same wall material in which radio waves cannot escape (for example, solid metal); varying floor plan layout, shapes, and traffic needs.	
<i>Examine the Radio Propagation Factor work sheet.</i> Is there a P-factor value for the Basic Input work sheet indicating that P-Builder was used to calculate the P-factor? For all P-factors that appear on the Radio Propagation Factor work sheet, can the P-factor be correlated to a given section entered on the Input by Section work sheet? NOTE: If P-Builder was not used to create the P-factor, check if it is equal to a P-factor for another section that was created using P-Builder. This information is found either in Section 0 of the Basic Input work sheet or in another section. If the characteristics of the matching sections are the same, the answer to this question is "yes." Is there no P-factor available? If so, ask the account representative how P-factor values were selected.	
<i>For each section in which a separate P-factor was calculated, determine the following:</i> Is the building type selection in alignment with the current product offer, architectural floor plan, and site data (to ensure that the office was not used for a factory, for example)? Are the following items for the section in alignment with the site survey data? --- Wall material selected for perimeter or bounding walls --- Floor construction material selected --- Ceiling construction material selected --- Ceiling clutter selected --- Floor plan layout selection of weighted interior wall materials --- Floor clutter selection of weighted values Is the calculated P-factor value for the section reasonable?	

Glossary

A

access rights

Air interface procedure that assigns the pocket phone a Temporary Portable User Identifier (TPUI) and its extension number. The pocket phone initiates this procedure each time it enters a system. A successful completion of the procedure includes an implicit Location Registration.

C

cell

Radio coverage area of a CAU.

Cell Antenna Unit (CAU)

Remote antenna that connects to a Wireless Fixed Base. It contains a transmit power amplifier, transmit/receive switch, low-noise receive amplifier, and antenna.

E

Emerging Technologies Band

20 MHz of unlicensed spectrum for Personal Communication Service (PCS) in North America. The band is isochronous (1920-1930 MHz) with eight channels of 1.25 MHz bandwidth per channel primarily for voice, and asynchronous (1910 to 1920 MHz) primarily for data.

Estimator

Tool within the WiSE Expert Design System that is used to gather information about the customer site. This tool is used to provide an initial price quote and to configure the DWBS.

F

Federal Communications Commission (FCC)

Government agency within the US that is responsible for assigning and regulating the radio spectrum so that it can be shared by many users without unacceptable interference.

fixed part

Part of the DWBS radio infrastructure that is not portable. This includes the Radio Controllers, Wireless Fixed Bases, and Cell Antenna Units.

I

I2

Interface between a Radio Controller and a Wireless Fixed Base.

I3

Interface between a Wireless Fixed Base and a Cell Antenna Unit.

Initialization and Administration System

Services support system for PBX administration and maintenance.

International Portable Equipment Identity

Unique number used to identify a pocket phone for administration and through-the-air communication. This number is sent by the pocket phone to the fixed part during the access rights procedure.

International Portable User Identity

Number sent by the fixed part to a pocket phone during the access rights procedure. Also, this number is sent by the pocket phone to the fixed part during the location registration procedure.

L

Location Registration

Through-the-air procedure used by the pocket phone to inform the fixed part that it has moved to a new cluster. If the pocket phone is active on a call, Location Registration is implied whenever there is an inter-RC or connection handover.

M

Mobility Manager (MM)

Software added to the DEFINITY system to control and track pocket phones as they change location within the DWBS coverage area. The Mobility Manager directs all control and voice information to the appropriate Radio Controller for each pocket phone. It is also responsible for the maintenance and administration of the DWBS and pocket phones.

P

portable part

Part of the DWBS radio infrastructure that is portable (most notably, the pocket phones).

Predictor

Tool within the WiSE Expert Design System that uses site information as input to determine the optimal placement of the antennas within the DWBS.

R

Radio Controller (RC)

Circuit pack that provides the interface between the DEFINITY system and the radio subsystem. It controls one or more Wireless Fixed Bases.

Radio Propagation Measurement Tool (RPMT)

Tool within the WiSE Expert Design System that is used to provide basic radio measurements.

The RPMT looks like a pocket phone and, once it is administered, it can also initiate and receive phone calls. The RPMT can supplement the Predictor, serve as a troubleshooting device, and be used at site surveys.

S

soft keys

Buttons whose labels appear on an associated display and whose labels and functions can change dynamically as the user performs functions and makes selections.

T

Terminal Portable User Identifier

Number returned by the fixed part to the pocket phone during the Location Registration procedure.

Time Division Multiple Access (TDMA)

Radio access method for which each call uses a different time slot. TDMA permits multiple conversations per radio.

U

UTAM

Group charged by the Federal Communications Commission to coordinate the relocation of microwave incumbents out of the unlicensed spectrum (1910 to 1930 MHz) and to coordinate the deployment of unlicensed devices and systems in that spectrum.

W

Wireless Fixed Base (WFB)

Component that houses the fixed radio hardware. It provides the radio functions to transmit digitally to the pocket phones and to receive digital signals from the pocket phones. A Wireless Fixed Base can support a maximum of four external Cell Antenna Units.

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