How to create a city: internet network

Topic: creating basic internet and phone networks in HERA

Introduction

This learning sheet builds practical, hands-on skills on how to develop a city in the HERA learning game. It is a step-by-step tutorial that familiarizes students and educators with the basic functionality of the HERA game, that they will need for creating more complex learning scenarios and/or for playing the game.

Creating a city simulates real-life urban design. Students and educators will be challenged to introduce installations and services that enrich quality of life, such as housing, commercial buildings, education provifders, industry, farms, health providers, cultural providers, energy providers, telephone providers, internet providers, roads, parks, and more.

This learning sheet demonstrates how to create an internet network in a HERA city.

Context

The activity may be used to get students and instructors familiarized with the HERA game functionality. It may be used as a pre-requisite, to be deployed before focusing on more complex game scenarios.

Learning goals

Upon completion of the activity students will be able to design an internet network for a functional HERA city.

Prerequisites

Students must have completed the “creating a small city – energy grids” activity. Students need basic understanding on phone and internet network design.

Audience

Engineering and economics students and instructors using the HERA game for developing problem-based learning skills.

Core concepts

- **Internet:** A global computer network providing a variety of information and communication services through standardized protocols.
- **Fiber optic cable:** An assembly similar to an electrical cable but containing one or more optic fibers that are used to carry light, providing higher data network capacity.
- **DSL cable:** An assembly for data transfer used in internet and phone networks.

Description of the scenario

During the activity students design a functional internet network that includes an ISP provider, ISP street stations, fiber optic, and DSL cables. To ensure that the network works properly, students and educators are encouraged to follow specific guidelines described below.

Suggested class activity

1. To demonstrate the design of an internet network, first create a hospital in your city by selecting the public services button and then the hospital tab at the bottom of the screen menu ().

   You will notice that to function properly the building requires medium voltage electricity, an internet connection, and a phone connection as indicated by the thumbnails that appear on top (see Figure 1 below).

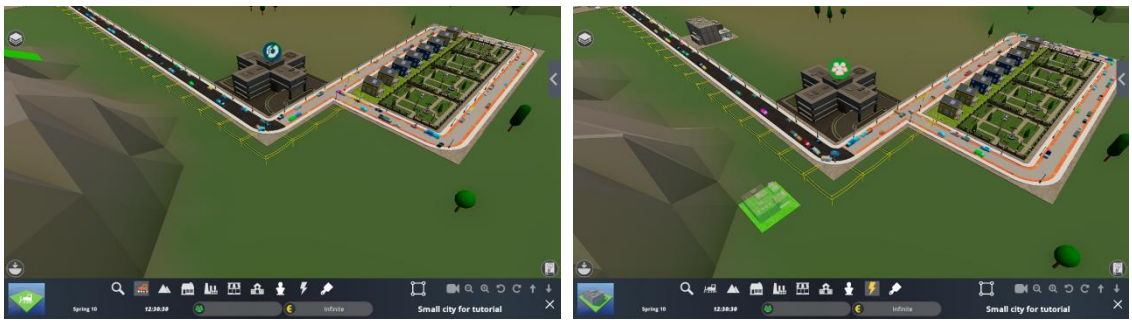

Figure 1. Build a university (left); then build an ISP core building (right).

2. If the ISP building is built adjacent to the road, as demonstrated in the figure, you will not need additional energy network connectivity as the road is “conductive”. If the building is not built adjacent to the road, then you will need to connect it to the electricity network as any other building.

3. Build an ISP street station by clicking on the infrastructure button ( ) then selecting the internet tab at the bottom of the screen menu. Connect the ISP core building to the ISP street station with a fiber optic cable; then connect the ISP street station to the university with a DSL cable. You may also connect the ISP street station to the neighborhood houses with a DSL cable. The internet network is now functional (see Figure 3 below).

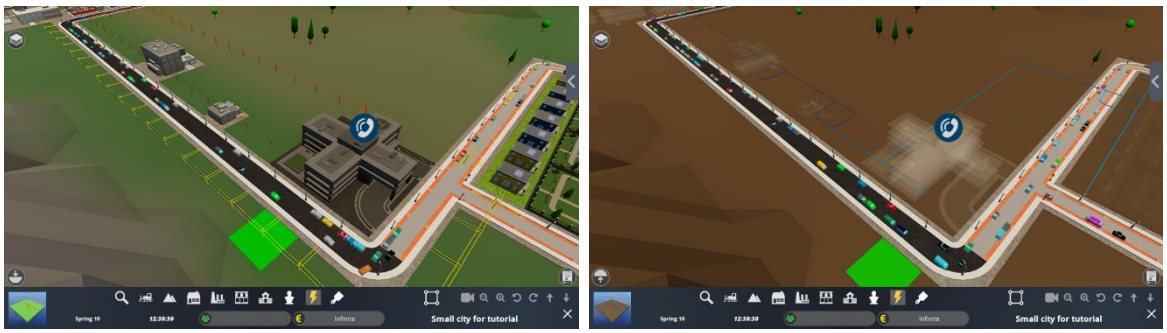

Figure 2. Create an ISP street station (left); connect the ISP core building to the ISP street station with a fiber optic cable; connect the ISP street station to the university with a DSL cable (right).

4. Connect the hospital with the medium voltage transformer through medium voltage cables using the infrastructure button and then the energy tab at the bottom of the screen menu (see Figure 3 below).

5. Install an antenna of your choice to introduce phone services to the hospital by clicking on the infrastructure button and then selecting the phone tab at the

bottom of the screen menu. The antenna needs to be connected to the ISP street station with a DSL line. In this example, the DSL line already exists. The hospital is now functional, meaning it has access to energy, internet, and phone services.

Figure 3. Connect the hospital to medium voltage energy (left); to introduce phone services, install a phone antenna and connect it to the ISP street station using a DSL cable (right);

Assessment methods

This activity aims to build basic skills on the deployment of the HERA learning game. Assessment of the skills developed may be performed using authentic models, namely models that encourage students to demonstrate the newly developed knowledge hands-on. More specifically, students may be asked to demonstrate the creation of a city for the benefit of themselves, their fellow students, and the instructor. Alternatively, students may be asked to submit a video recording in which the creation of their city is demonstrated.