### 7.28.4 Rationale

Allows the user to enter their companies maximum Fiber size normally deployed as long as it does not exceed 288 srands.

## 7.29 Maximum Size Feeder Distribution Interface [MaxSizeFDI]

### 7.29.1 Definition

This input represents the maximum size FDI cross connect box the Model will configure. An FDI is the interface between copper feeder cables and copper distribution cables. FDI's are standard cross-connect boxes deployed in today's network. Size is based on the total of the distribution cable sizes leaving the FDI. For example, if the total distribution cable size is 1800 pair than a 3600 pair FDI is placed. The largest interface assumed is 3600 pair. Beyond that size then two separate interfaces are assumed.

### 7.29.2 Default Input Value

| MaxSizeFDI |
|---|
| 4200 |

### 7.29.3 Source

These inputs should be obtained from Outside Plant planning or engineering experts for those cable sizes the company utilizes under study, if possible. The values supplied with BCPM are defaults and represent the judgment and experience of The LEC engineering Team subject matter experts

### 7.29.4 Rationale

Allows the user to enter their companies maximum FDI cross-connect box normally deployed as long as it does not exceed 4200 pairs.

## 7.30 Maximum Slope Factor [MaxSlopeFactor]

### 7.30.1 Definition

This value is the distance multiplier when maximum slope causes cables to be extended to "switchback" on a slope or go around large sloping areas.

### 7.30.2 Default Input Value

| MaxSlopeFactor |
|---|
| 1.05 |

### 7.30.3 Source

The source is taken from the State Soil Geography (STATSGO) data based produced by the United States Department of Agriculture.

## 7.31 Maximum Slope Trigger [MaxSlopeTrigger]

### 7.31.1 Definition

Slope triggers are set at the present slope when facilities must be placed along the contours of the hillside rather than in a point-to-point placement. This is one of three different slope triggers used within the model to adjust distance. The maximum slope trigger [default] is set at 30 degrees. When this average is exceeded the distance is adjusted by the maximum slope factor. Reference Section 7.30. For example, if the average terrain within a given grid is 30 degree or less, no additional adjustment for cable distance, and hence cost, is required.

### 7.31.2 Default Input Value

| MaxSlopeTrigger |
|---|
| 30 |

### 7.31.3 Source

The source is taken from the State Soil Geography (STATSGO) data based produced by the United States Department of Agriculture.

### 7.31.4 Rationale

Since more cable is required when winding along contours of hillsides rather than cable placement in straight flat terrain, this input allows for the additional distance that facilities will require when traveling along this higher sloped terrain. Thereby, triggering the Model to compensate cables and structures cost.

## 7.32 Minimum Slope Factor [MinSlopeFactor]

### 7.32.1 Definition

Slope triggers are set at the present slope when facilities must be placed along the contours of the hillside rather than in a point-to-point placement. Slope factors are the multipliers used to add the additional distance that the facilities must travel as they wind their way across the higher slope terrain. This factor comes in to play when ONLY the minimum slope trigger is exceeded, thereby, adjusting the cable distance using this minimum slope factor.

### 7.32.2 Default Input Value

| MinSlopeFactor |
|---|

| 1.10 |
|---|

### 7.32.3 Source

The source is taken from the State Soil Geography (STATSGO) data based produced by the United States Department of Agriculture.

### 7.32.4 Rationale

Since more cable is required when winding along contours of hillsides rather than cable placement in straight flat terrain, this input allows for the additional distance that facilities will require when traveling along this higher sloped terrain. Thereby, triggering the Model to compensate cables and structures cost.

## 7.33 Minimum Slope Trigger [MinSlopeTrigger]

### 7.33.1 Definition

Slope triggers are set at the present slope when facilities must be placed along the contours of the hillside rather than in a point-to-point placement. This is one of three different slope triggers used within the model to adjust distance. The minimum slope trigger [default] is set at 12 degrees. When this average is exceeded the distance is adjusted by the minimum slope factor. Reference Section 7.32. For example, if the average terrain within a given grid is 12 degree or less, no additional adjustment for cable distance, and hence cost, is required.

### 7.33.2 Default Input Value

| MinSlopeTrigger |
|---|
| 12 |

### 7.33.3 Source

The source is taken from the State Soil Geography (STATSGO) data based produced by the United States Department of Agriculture.

### 7.33.4 Rational

Since more cable is required when winding along contours of hillsides rather than cable placement in straight flat terrain, this input allows for the additional distance that facilities will require when traveling along this higher sloped terrain. Thereby, triggering the Model to compensate cables and structures cost.

## 7.34 New Terrain Factor [NewTerrainFactor]

### 7.34.1 Definition

(Provided as a contingency input in he event the user has data related to additional cost impacting terrain characteristics not presently in the model.)

### 7.34.2 Default Input Value

| NewTerrainFactor |
|---|
| 1 |

### 7.34.3 Source

### 7.34.4 Rational

## 7.35 New Terrain Trigger [NewTerrainTrigger]

### 7.35.1 Definition

(Provided as a contingency input in he event the user has data related to additional cost impacting terrain characteristics not presently in the model.)

### 7.35.2 Default Input Value

| NewTerrainTrigger |
|---|
| 5 |

### 7.35.3 Source

### 7.35.4 Rationale

## 7.36 Normal Fiber Cover

### 7.36.1 Definition

This input represents the normal placement depth, in inches, for buried and underground fiber cable as Standards set in the AT&T/Lucent OSP Handbook.

### 7.36.2 Default Input Value

| NormalFiberCover |
|---|

| 36.00 |
|---|

### 7.36.3 Source

These inputs should be obtained from Outside Plant planning or engineering experts for the company under study, if possible. The values supplied with BCPM are defaults and represent the judgment and experience of The LEC engineering Team subject matter experts.

### 7.36.4 Rationale

The increased depth over conventional exchange cable is due to large circuit carrying capacity of fiber optic cable and the class of service being transmitted.

## 7.37 Normal Underground Buried Cover [NormalUGBuriedCover]

### 7.37.1 Definition

This input represents the normal placement depth, in inches, for buried and underground feeder and distribution cable as Standards set in the AT&T/Lucent OSP Handbook. This would be the minimum depth. Greater depths could be required depending on risk of dig-ups and future digging is likely to occur.

### 7.37.2 Default Input Value

| NormalUGBuriedCover |
|---|
| 24.00 |

### 7.37.3 Source

These inputs should be obtained from Outside Plant planning or engineering experts for the company under study, if possible. The values supplied with BCPM are defaults and represent the judgment and experience of The LEC engineering Team subject matter experts.

### 7.37.4 Rationale

This depth is based on the minimum placement depth for the LECs for Plastic Insulated Copper Conductor [PIC] cables across the United States.

## 7.38 Optic Fiber Terminal Cost [OpticCost]

### 7.38.1 Definition

This miscellaneous input represents material and installation cost for fiber optics terminals at the central office and customer location to multiplex DS3 to DS1 circuits.

### 7.38.2 Default Input Value

| OpticsCost |
|---|
| $75,000.00 |

### 7.38.3 Source

These inputs should be obtained from Outside Plant planning or engineering experts for the company under study, if possible. The values supplied with BCPM are defaults and represent the judgment and experience of The LEC engineering Team subject matter experts.

### 7.38.4 Rationale

This allows the cost of electronics for terminating private line and digital PBX services at a DS1 signal level.

## 7.39 Minimum Number of Pairs Per Business Location [PairsPerBusinessLocation]

### 7.39.1 Definition

The Model assumes six pairs for a business location. However, the Model uses the actual number of business lines, data utilized from the specific state Base_Loop3_ETRS.csv file, if it exceeds the user adjustable lines per business location. This input is used extensively in Distribution calculations [Term, Drop & NID] and New Distribution.

### 7.39.2 Default Input Value

| PairsPerBusinessLocation |
|---|
| 6 |

### 7.39.3 Source

These inputs should be obtained from Outside Plant planning or engineering experts for the company under study, if possible. The values supplied with BCPM are defaults and represent the judgment and experience of The LEC engineering Team subject matter experts.

### 7.39.4 Rationale

Using this design criterion, cables are then appropriately sized.

## 7.40 Distribution Pairs Per Residential Housing Unit [PairsPerHousingUnit]

### 7.40.1 Definition

The Model assumes two pairs for a resident unit. However, the Model uses the actual number of housing units, data utilized from the specific state Base_Loop3_ETRS.csv file. This input is used extensively in Distribution calculations [Term, Drop & NID] and New Distribution.

### 7.40.2 Default Input Value

| PairsPerHousingUnit |
|---|
| 2 |

### 7.40.3 Source

These inputs should be obtained from Outside Plant planning or engineering experts for the company under study, if possible. The values supplied with BCPM are defaults and represent the judgment and experience of The LEC engineering Team subject matter experts.

### 7.40.4 Rationale

Using this design criterion, cables are then appropriately sized.

## 7.41 Remote Terminal DLC Large Per Line Investment Extended Range [RTDLCLExRange]

### 7.41.1 Definition

This input defines the cost per remote terminal DLC-L per line investment for the extended range line cards used in calculating of large electronic costs in the Loop.xls module. The default per line investment for extended range cost represents several DLC vendors such as RELTEC and DSC. The value is derived by dividing the cost of the Extended Range line card by 4; the number of circuits on one card. The cards are deployed at the RT end when the loop exceeds 13,600 feet.

### 7.41.2 Default Input Value

| RTDLCLPerLineExRange |
|---|
| 187.50 |

### 7.41.3 Source

These inputs should be obtained from Outside Plant planning or engineering experts for the company under study, if possible. The values supplied with BCPM are defaults and represent the judgement and experience of The LEC engineering Team subject matter experts.

### 7.41.4 Rationale

Provides the user the ability to place company specific per line cost for large DLC units with extended range line cards that allow for longer loops and retain the ability to offer advanced services in a forward looking network.

## 7.42 Remote Terminal DLC Small Per Line Investment Extended Range [RTDLCSExRange]

### 7.42.1 Definition

This input defines the cost per remote terminal DLC-S per line investment for the extended range line cards used in calculating of small electronic costs in the Loop.xls module. The default per line investment for extended range cost represents several DLC vendors such as AFC and NEC. The value is derived by dividing the cost of the Extended Range line card by 6; the number of circuits on one card. The cards are deployed at the RT end when the loop exceeds 13,600 feet.

### 7.42.2 Default Input Value

| RTDLCSPerLineExRange |
|---|
| 125.00 |

### 7.42.3 Source

These inputs should be obtained from Outside Plant planning or engineering experts for the company under study, if possible. The values supplied with BCPM are defaults and represent the judgement and experience of The LEC engineering Team subject matter experts.

### 7.42.4 Rationale

Provides the user the ability to place company specific per line cost for small DLC units with extended range line cards that allow for longer loops and retain the ability to offer advanced services in a forward looking network.

## 7.43 Small DLC Electronic Discount [SmallDLCDiscount]

### 7.43.1 Definition

This miscellaneous input is set at zero percent as discounts are already applied to the DLC and electronic cost data. To apply additional discounts to DLC investment in this table, a user should adjust the total amount of the discount to account for the inclusion of vendor material discounts in the DLC cost tables Section 6.0 of this manual.

### 7.43.2 Default Input Value

| SmallDLCDiscount |
|---|
| 0.00 |

### 7.43.3 Source

These inputs should be obtained from Outside Plant planning or engineering experts for the company under study, if possible. The values supplied with BCPM are defaults and represent the judgment and experience of The LEC engineering Team subject matter experts. **Discounts are set to zero if the DLC prices already reflect the appropriate discounts**

### 7.43.4 Rationale

Allows the user to adjust for additional DLC discounts for their company specific Digital Loop Carrier costs.

## 7.44 Water Factor

### 7.44.1 Definition

This input represents the cost penalty or additive for placing cable in or going around areas with water present at the cable placement depth.

### 7.44.2 Default Input Value

| WaterFactor |
|---|
| 30.00 |

### 7.44.3 Source

Data was taken from comparable contractor prices for areas with and without water present at or above the cable placement depth.

### 7.44.4 Rationale

This input allows the user to enter the specific cost penalty applicable to the company or geographical area being studied.


# Benchmark Cost Proxy Model
# Release 3.1

# Switch Model Inputs

**April 30, 1998 Edition**

**Developed by**
**BellSouth, *INDETEC* International,**
**Sprint and U S WEST**

# Preface

The purpose of this document is to discuss the definition, value, source and rationale for the individual inputs for BCPM 3.1. This edition includes information on the Switching module inputs. Descriptions of inputs associated with the other modules contained in BCPM 3.1 are provided in their respective Model Inputs documents.

A more general discussion of the inputs for the other modules of BCPM 3.1 can be found in the BCPM 3.1 Model Methodology.

# SWITCH MODEL INPUTS
## Contents

# BCPM Switch Model Inputs

# 1 State Default Table

This table contains inputs that can reasonably be made specific to the state and company level. The input values supplied with BCPM 3.1 represent what the sponsors consider to be reasonable representative values for these inputs. The defaults are provided for the convenience of users who may not have access to more specific data. Some are based upon observations and the judgement of BCPM subject matter experts. The BCPM Sponsors do not represent the provided values as necessarily appropriate for every potential serving area. Many of the inputs have a wide range of valid values. We recommend that the user replace these values with state and company specific inputs whenever available. Several of these inputs are state defaults to be used when CLLI-specific data has not been provided via the Switch-Specific Data Table.

## 1.1 State

### 1.1.1 Definition

The state to which the inputs pertain.

### 1.1.2 Typical Input Value

Not Applicable.

### 1.1.3 Source

Postal abbreviations for states and territories.

### 1.1.4 Rationale

Allows data to be provided on a state-specific basis.

## 1.2 ARMIS Percent Local Calls

### 1.2.1 Definition

Percent of calls that are local (intra-switch and inter-switch). Includes Extended Area Service (EAS) calling.

### 1.2.2 Typical Input Value

| ARMIS Percent Local Calls |
|---|
| 81.5% |

### 1.2.3 Source

Derived from ARMIS Report 43-08, Number of Local Calls / Total Calls. The values supplied with BCPM are state-specific.

### 1.2.4 Rationale

The percent local calls is used along with a number of local calls per line to develop an engineered number of calls per line for use in switch investment estimation. This typical value represents the average of all states.

## 1.3 ARMIS Percent Toll Calls

### 1.3.1 Definition

Percent of calls that are IntraLATA and InterLATA toll.

### 1.3.2 Typical Input Value

.

| ARMIS Percent Toll Calls |
|---|
| 18.5% |

### 1.3.3 Source

Derived from ARMIS Report 43-08, (Number of IntraLATA toll calls plus InterLATA toll calls) / Total Calls. The values supplied with BCPM are state-specific.

### 1.3.4 Rationale

The percent toll calls is used along with a number of toll calls per line to develop an engineered number of calls per line for use in switch investment estimation. This typical value represents the average of all states.

## 1.4 ARMIS Percent Residence Lines

### 1.4.1 Definition

This is the percentage of switched local exchange lines that are residential.

### 1.4.2 Typical Input Value

| Percent Residence Lines |
|---|
| 67.4% |

### 1.4.3 Source

Derived from ARMIS 43-08 results. The values supplied with BCPM are state-specific.

### 1.4.4 Rationale

This input is used to develop the engineered busy hour calls and CCS per line when the user opts to develop those parameters from direct input of calls and minutes. It is also used to develop customer calling characteristics that are used to determine the percent of usage investment that is attributable to USF. This typical value represents the average of all states.

## 1.5 Percent Business Lines

### 1.5.1 Definition

This is the percentage of switched local exchange lines that are business (single- and multi-line).

### 1.5.2 Typical Input Value

| Percent Business Lines |
|---|
| 32.6% |

### 1.5.3 Source

Derived from ARMIS 43-08 results. The values supplied with BCPM are state-specific.

### 1.5.4 Rationale

This input is used to develop the engineered busy hour calls and CCS per line when the user opts to develop those parameters from direct input of calls and minutes. It is also used to develop customer calling characteristics that are used to determine the percent of usage investment that is attributable to USF. This typical value represents the average of all states.

## 1.6 Default Engineered Calls per Line

### 1.6.1 Definition

This is the number of Busy Hour calls per line used to engineer switches. This input is used to estimate total switch investments if the user opts not to develop this value by inputting assumptions about the number of calls and minutes per line. If the user has provided CLLI-specific inputs via the User Data table, then those will be used instead of this default.

### 1.6.2 Default Input Value

| Default Engineered Calls per Line |
|---|
| 2.5 |

### 1.6.3 Source

This input should be obtained from switch engineering experts for the company under study, if possible. The default input value represents the judgement and experience of BCPM sponsor company subject matter experts.

### 1.6.4 Rationale

This input was chosen to be consistent with the engineering data used to price switches and as input to Audited LEC Switch Models (ALSMs). A round number was selected to protect the confidentiality of the actual data. Typically, switches are engineered to a single traffic input such as this, rather than discrete estimates of residential and business usage.

## 1.7 Default Engineered CCS per Line

### 1.7.1 Definition

This is the number of Busy Hour CCS per line used to engineer switches. This input is used to estimate total switch investments if the user opts not to develop this value by inputting assumptions about the number of calls and minutes per line. If the user has provided CLLI-specific inputs via the User Data table, then those will be used instead of this default.

### 1.7.2 Default Input Value

| Default Engineered CCS per Line |
|---|
| 3.6 |

### 1.7.3 Source

This input should be obtained from switch engineering experts for the company under study, if possible. This input represents the judgement and experience of BCPM sponsor company subject matter experts.

### 1.7.4 Rationale

This input was chosen to be consistent with the engineering data used to price switches and as input to Audited LEC Switch Models (ALSMs). A round number was selected to protect the confidentiality of the actual data. Typically, switches are engineered to a single traffic input such as this, rather than discrete estimates of residential and business usage.

## 1.8 Number of Busy Hour Local/EAS Calls per Residence Line (Optional)

### 1.8.1 Definition

This is the number of Busy Hour residence calls per line (Local and Extended Area Service) to be designated as Universal Service usage. There are two user-defined options under which this input is used:

- Engineering Option set to "C": This input is used to estimate the total switch invesment.
- USF Option set to "C": This input is used to determine the portion of total usage investment attributable to Universal Service.

### 1.8.2 Suggested Input Value

| Number of Busy Hour Local/EAS Calls per Residence Line |
|---|
| 2.0 |

### 1.8.3 Source

We recommend that the user request wire-center specific studies to obtain this data if possible. Telco engineering departments may have switch engineering data that could be used. The value supplied here was chosen to be consistent with the engineering data supplied for input 1.6.

### 1.8.4 Rationale

The BCPM Sponsors believe that engineering data provides the most reliable source for this input.

## 1.9 Number of Busy Hour Local/EAS Calls per Business Line (Optional)

### 1.9.1 Definition

This is the number of Busy Hour business calls per line (Local and Extended Area Service) to be designated as Universal Service usage. There are two user-defined options under which this input is used:

- Engineering Option set to "C": This input is used to estimate the total switch invesment.
- USF Option set to "C": This input is used to determine the portion of total usage investment attributable to Universal Service.

### 1.9.2 Suggested Input Value

| Number of Busy Hour Local/EAS Calls per Business Line |
|---|
| 2.0 |

### 1.9.3 Source

We recommend that the user request wire-center specific studies to obtain this data if possible. Telco engineering departments may have switch engineering data that could be used. The value supplied here was chosen to be consistent with the engineering data supplied for input 1.6.

### 1.9.4 Rationale

The BCPM Sponsors believe that engineering data provides the most reliable source for this input.

## 1.10 Number of Busy Hour Toll Calls per Residence Line (Optional)

### 1.10.1 Definition

This is the number of Busy Hour residence calls per line (IntraLATA Toll and InterLATA Toll). There are two user-defined options under which this input is used:

- Engineering Option set to "C": This input is used to estimate the total switch invesment.
- USF Option set to "C": This input is used to determine the portion of total usage investment attributable to Universal Service.

### 1.10.2 Suggested Input Value

| Number of Busy Hour Toll Calls per Residence Line |
|---|
| 0.5 |

### 1.10.3 Source

We recommend that the user request wire-center specific studies to obtain this data if possible. Telco engineering departments may have switch engineering data that could be used. The value supplied here was chosen to be consistent with the engineering data supplied for input 1.6.

### 1.10.4 Rationale

The BCPM Sponsors believe that engineering data provides the most reliable source for this input.

## 1.11 Number of Busy Hour Toll Calls per Business Line (Optional)

### 1.11.1 Definition

This is the number of Busy Hour business calls per line (IntraLATA Toll and InterLATA Toll). There are two user-defined options under which this input is used:

- Engineering Option set to "C": This input is used to estimate the total switch invesment.
- USF Option set to "C": This input is used to determine the portion of total usage investment attributable to Universal Service.

### 1.11.2 Suggested Input Value

| Number of Busy Hour Toll Calls per Business Line |
|---|
| 0.5 |

### 1.11.3 Source

We recommend that the user request wire-center specific studies to obtain this data if possible. Telco engineering departments may have switch engineering data that could be used. The value supplied here was chosen to be consistent with the engineering data supplied for input 1.6.

### 1.11.4 Rationale

The BCPM Sponsors believe that engineering data provides the most reliable source for this input.

## 1.12 Number of Local/EAS Minutes per Call per Residence Line (Optional)

### 1.12.1 Definition

This is the number of Minutes per residence call (Local and Extended Area Service). There are two user-defined options under which this input is used:

- Engineering Option set to "C": This input is used to estimate the total switch invesment.
- USF Option set to "C": This input is used to determine the portion of total usage investment attributable to Universal Service.

### 1.12.2 Suggested Input Value

| Number of Local/EAS Minutes per Call per Residence Line |
|---|
| 2.5 |

### 1.12.3 Source

We recommend that the user request wire-center specific studies to obtain this data if possible. Telco engineering departments may have switch engineering data that could be used. The value supplied here was chosen to be consistent with the engineering data supplied for input 1.7.

### 1.12.4 Rationale

The BCPM Sponsors believe that engineering data provides the most reliable source for this input.

## 1.13 Number of Local/EAS Minutes per Call per Business Line (Optional)

### 1.13.1 Definition

This is the number of Busy Hour Minutes per business call (Local and Extended Area Service). There are two user-defined options under which this input is used:

- Engineering Option set to "C": This input is used to estimate the total switch invesment.
- USF Option set to "C": This input is used to determine the portion of total usage investment attributable to Universal Service.

### 1.13.2 Suggested Input Value

| Number of Local/EAS Minutes per Call per Business Line |
|---|
| 2.5 |

### 1.13.3 Source

We recommend that the user request wire-center specific studies to obtain this data if possible. Telco engineering departments may have switch engineering data that could be used. The value supplied here was chosen to be consistent with the engineering data supplied for input 1.7.

### 1.13.4 Rationale

The BCPM Sponsors believe that engineering data provides the most reliable source for this input.

## 1.14 Number of Toll Minutes per Call per Residence Line (Optional)

### 1.14.1 Definition

This is the number of Busy Hour Minutes per residence call (InterLATA Toll and IntraLATA Toll). There are two user-defined options under which this input is used:

- Engineering Option set to "C": This input is used to estimate the total switch invesment.
- USF Option set to "C": This input is used to determine the portion of total usage investment attributable to Universal Service.

### 1.14.2 Suggested Input Value

| Number of Toll Minutes per Call per Residence Line |
|---|
| 2.5 |

### 1.14.3 Source

We recommend that the user request wire-center specific studies to obtain this data if possible. Telco engineering departments may have switch engineering data that could be used. The value supplied here was chosen to be consistent with the engineering data supplied for input 1.7.

### 1.14.4 Rationale

The BCPM Sponsors believe that engineering data provides the most reliable source for this input.

## 1.15 Number of Toll Minutes per Call per Business Line (Optional)

### 1.15.1 Definition

This is the number of Busy Hour Minutes per business call (InterLATA Toll and IntraLATA Toll). There are two user-defined options under which this input is used:

- Engineering Option set to "C": This input is used to estimate the total switch invesment.
- USF Option set to "C": This input is used to determine the portion of total usage investment attributable to Universal Service.

### 1.15.2 Suggested Input Value

| Number of Toll Minutes per Call per Business Line |
|---|
| 2.5 |

### 1.15.3 Source

We recommend that the user request wire-center specific studies to obtain this data if possible. Telco engineering departments may have switch engineering data that could be used. The value supplied here was chosen to be consistent with the engineering data supplied for input 1.7.

### 1.15.4 Rationale

The BCPM Sponsors believe that engineering data provides the most reliable source for this input.

## 1.16 Land Loading

### 1.16.1 Definition

The ratio of land investment to central office investment.

### 1.16.2 Default Input Value

| Land Loading |
|---|
| 0.0117 |

### 1.16.3 Source

The land ratio is based upon the 1995 ARMIS values of Land divided by the sum of COE (Switching, Operator and Transmission).

### 1.16.4 Rationale

Application of this ratio produces an investment in land needed to place the central office. The investment function is:

*Land investment = Land Loading * Switch Investment*