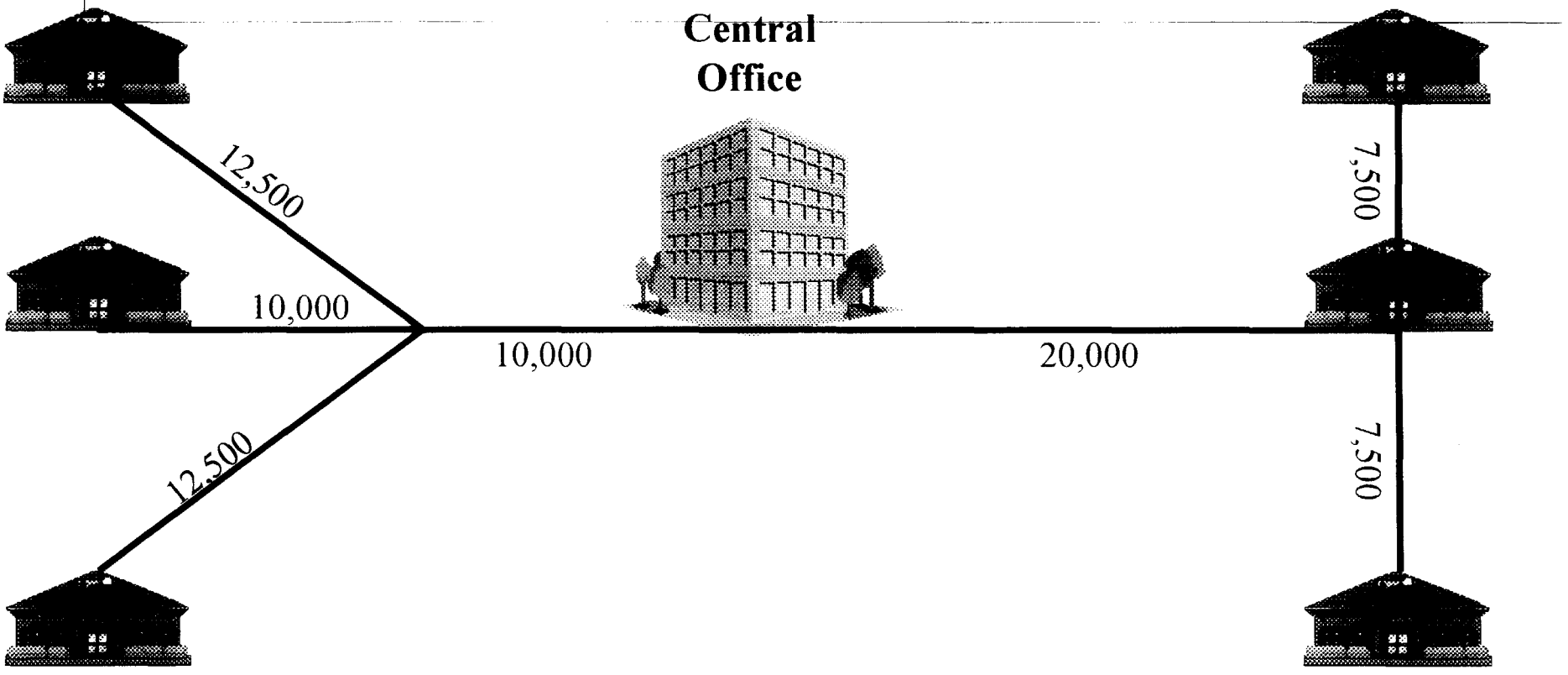
Efficient Feeder Design

Issue: Design of feeder plant should reach serving areas with minimum total route distance

- BCPM feeder design minimizes average feeder length, but produces higher total route distance
- HAI Model design minimizes total route distance

BCPM Inflates Route Miles While Reducing Average Distance



Average Distance = 21,667

Total Route (Structure) Distance = 45,000

Average Distance = 25,000

Total Route (Structure) Distance = 35,000

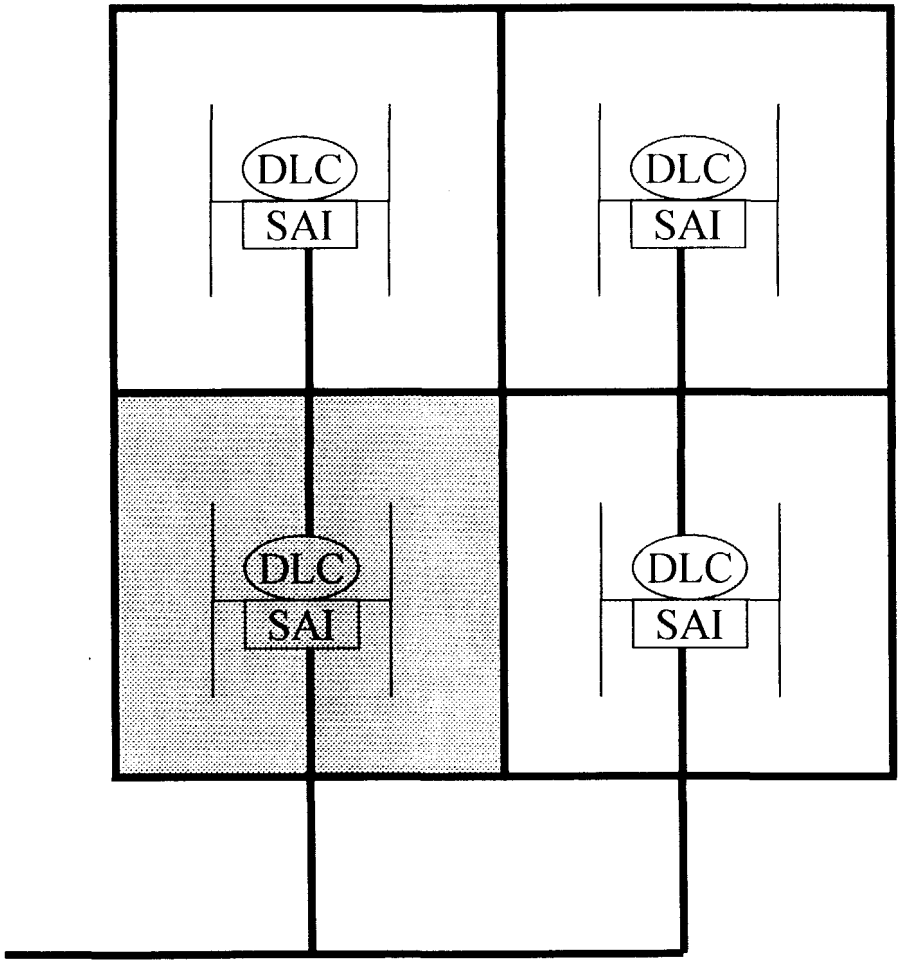
Efficient Feeder Design

Issue: Design of cable routes should minimize total route distance

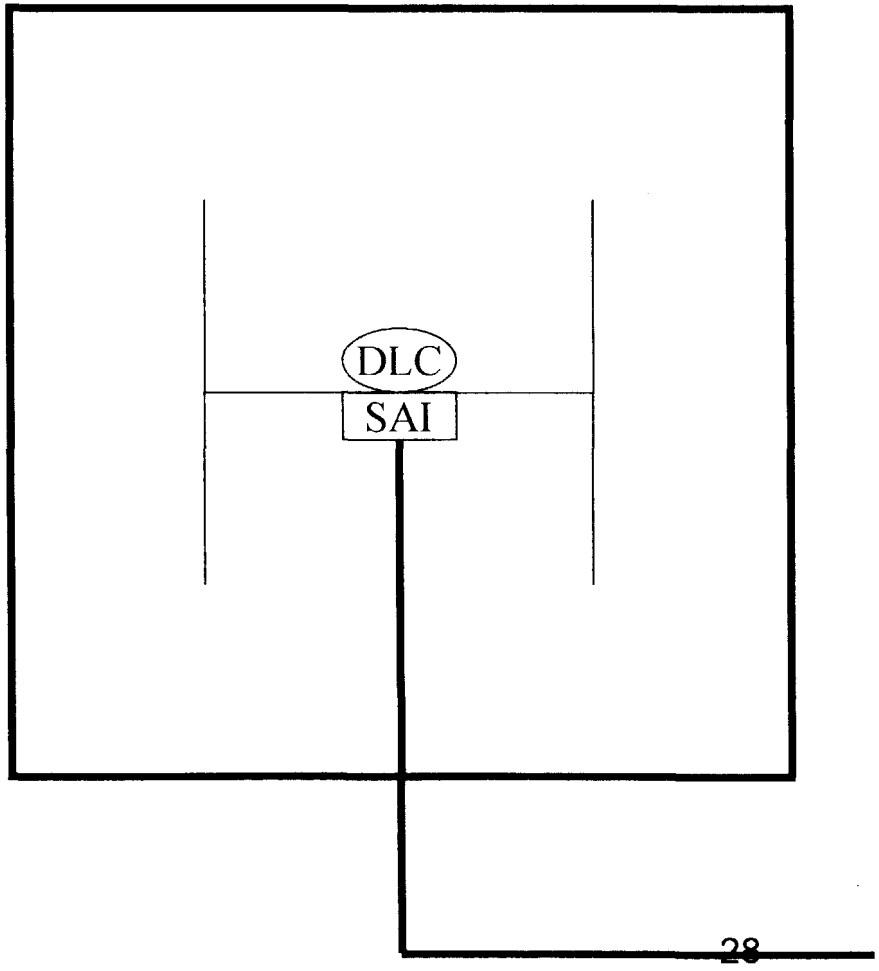
- BCPM runs separate subfeeder routes to each distribution area
- HAI branching distribution cables serves the same locations more efficiently

BCPM Design Results in Excessive Serving Areas and Excessive Investment

BCPM Design



Efficient Design



Feeder Technology

Issue: Feeder plant may be either analog copper or digital fiber. The choice of fiber or copper is affected by many factors that determine cost of each solution

- BCPM uses an arbitrary threshold to determine choice of feeder technology
- HCPM choice is based on arbitrary thresholds and relative first cost
- The HAI model examines total life cycle costs of each technology and selects least-cost solution within technical constraints

Switch Engineering

- The HM 5.0 Switching and Interoffice Module sizes and costs switches based on:
  - Line counts, by business/residence
  - Traffic statistics (e.g., BHCCS, BHCA, holding times)
- Switch may be designated as:
  - Host, remote or standalone -- with specific host/remote mappings; or
  - A “blend” of all types

Switch Engineering

- Costs of host/remote systems are spread evenly across all lines of the total system
- Calculated traffic loads at WC are passed to transport and signaling modules

Switching

Issue: FNPRM requires that models be open to public scrutiny

- BCPM relies upon proprietary SCM and SCIS cost models for switching costs
  - models are proprietary and "black box" in nature
  - data inputs are proprietary
- HAI Model uses publicly-available data inputs, and all model logic is open to scrutiny

Transport Engineering

- Interoffice transport routes are engineered to link all of a company's WCs in a LATA
  - For WCs exceeding 1 line(s), routing is SONET ring
  - For WCs less than 1 line(s), routing is spur (folded SONET ring) to the nearest WC that is on a ring
- WCs are added to rings pursuant to an optimizing ring-building algorithm
  - Individual rings meet capacity limits
  - Inter-ring connectors constructed
- Tandem switching is engineered

Interoffice Transport

Issue: Interoffice transport networks should be based on forward-looking design

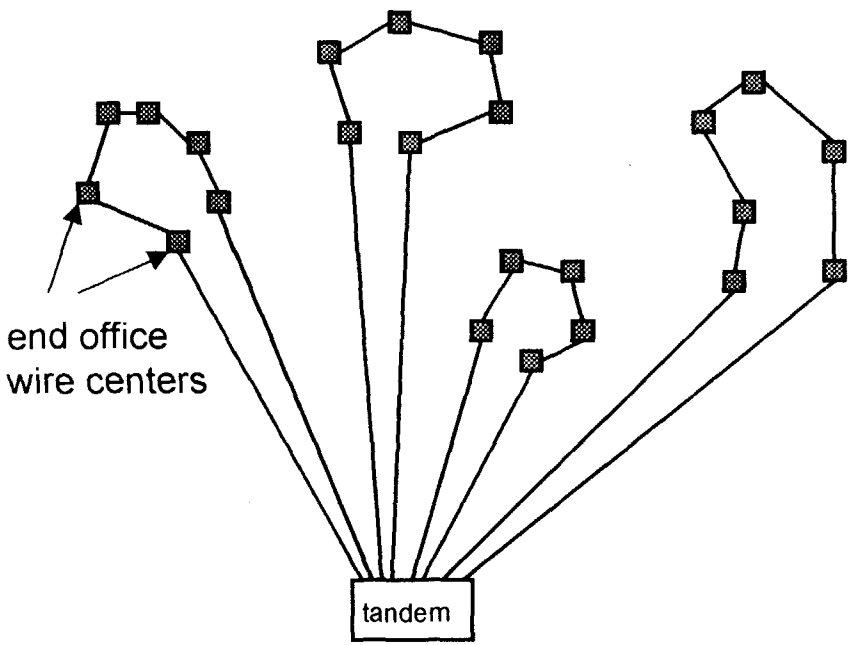
- BCPM uses embedded relationships between end office and tandem switches, and embedded mix of host and remote switches
- The HAI Model optimizes tandem/end office relationships, and permits specification of optimal mix of host and remote switches

Interoffice Transport

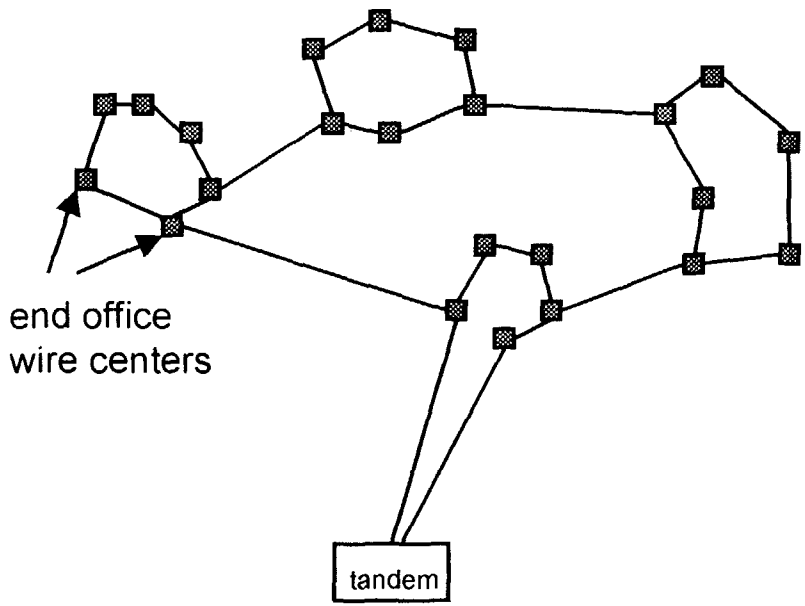
Issue: Interoffice networks should be designed to most efficiently connect wire centers and tandems

- BCPM uses rigid assumptions for connecting wire centers to rings and rings to tandems, resulting in inefficiency
- HAI Model ring-building algorithm efficiently places wire centers on rings, and efficiently connects wire centers and rings to tandems

Efficient and inefficient tandem ring arrangements



Inefficient ("Lollipop")



Efficient ("ring of rings")

Signaling Engineering

- Signaling demands computed
  - For ISUP and TCAP messages
  - For local, toll and access use
- STP pairs engineered to handle LATA demand
- Signaling links engineered interconnect switches with STPs and SCPs
- SCP/database capacity engineered
- All signaling network elements are engineered to provide 100+% redundancy

Signaling

Issue: Modeling of signaling costs should be integrated into modeling of other components of the network

- BCPM does not model signaling costs
- Uses input values derived from proprietary model run for US West territory
- The HAI Model explicitly models all signaling network components in relationship to other components of network

Expense Modules

- The HM 5.0 Expense Modules take as input the network investments calculated in the Distribution, Feeder and SIO modules and calculate unit costs
  - Capital carrying cost of investments
  - Maintenance, repair and operating expenses
  - Common overheads
- Produce reports:
  - For USF, UNEs, access and interconnection
  - Disaggregated to the study area, density zone, wire center, CBG or cluster levels

User Operation of the Model

- The HAI Model 5.0 comes complete with its national dataset and documentation on a CD-ROM
  - No separate licenses to execute
  - No hidden data
- Has simple user interface which allows:
  - Easy examination and adjustment of the HM 5.0's over 1400 user-adjustable inputs
  - Reliable, automated execution of the model
- Requires fast Pentium PC with Microsoft Office 97 software