

New Architecture of the Distribution System Using Electronic Transformer

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Distribution Transformer, Breakers, Switches and Arresters
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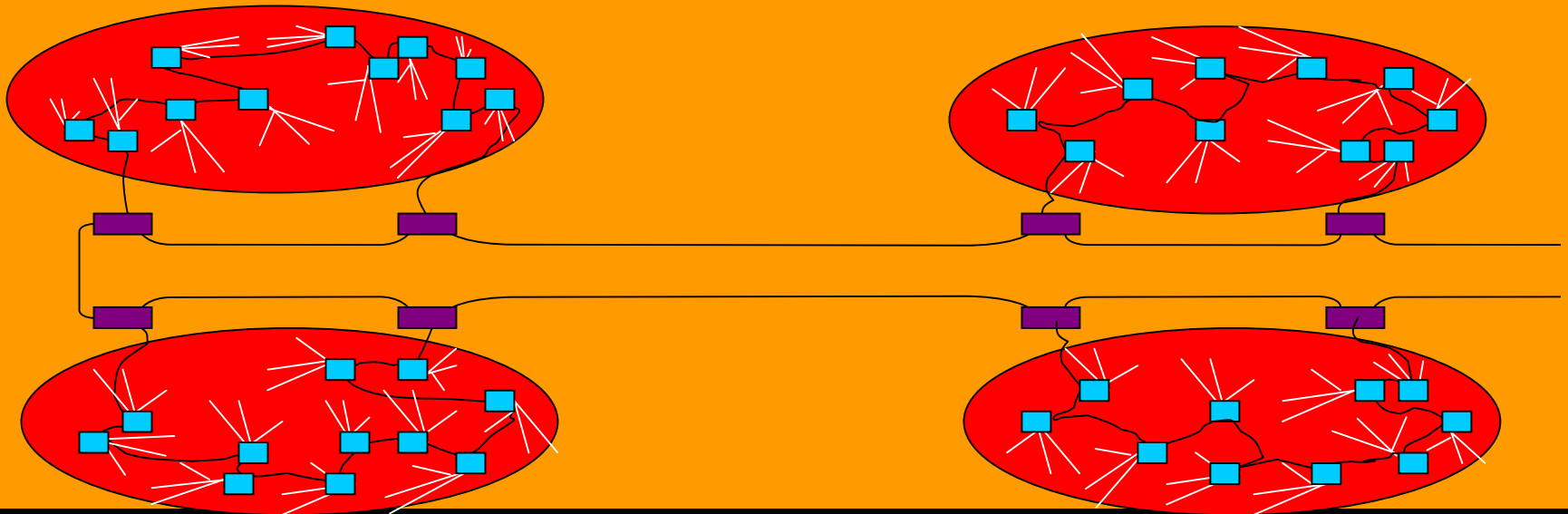
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Issues Addressed

- Present practice
- New concept
- Economical issue

Present Practice : Power System for Residential Area

- Main MV feeder (underground or overhead)
- Local MV feeder: looped single phase
- MV-LV 100, 167-kVA Transformers (10 to 15 customers/tx)
- LV radial 120/240 V network
- Cable drop



Present Practice: Underground Infrastructure

- Variable number of buried cables
- Using connection boxes

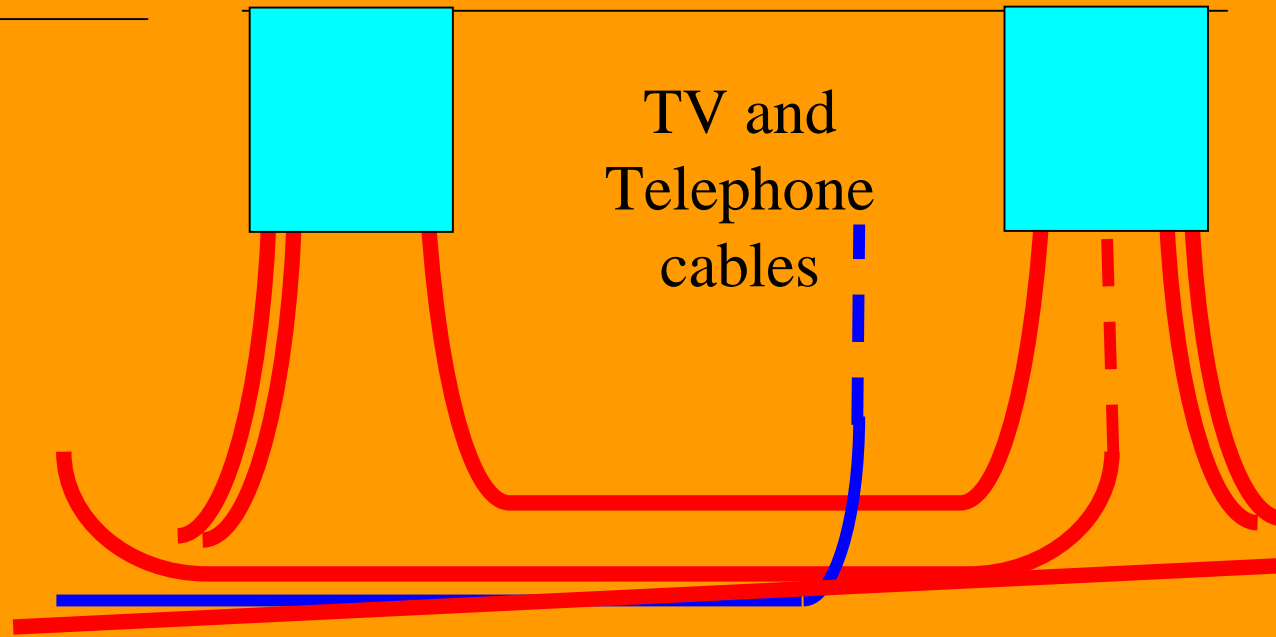
Side
walk

Trench

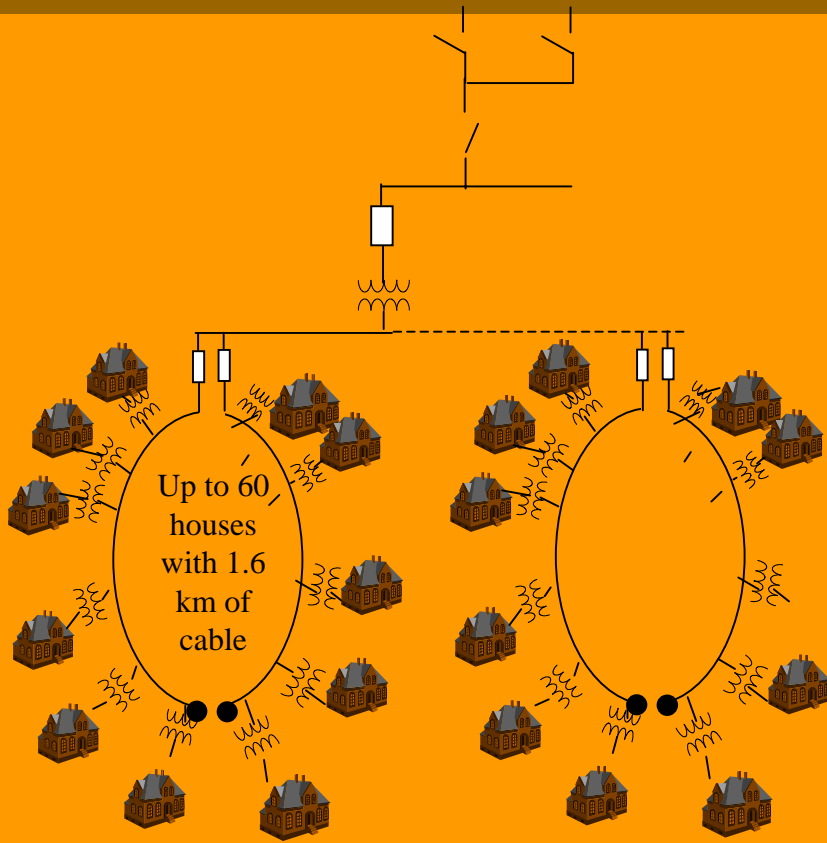
MV
system

LV
system

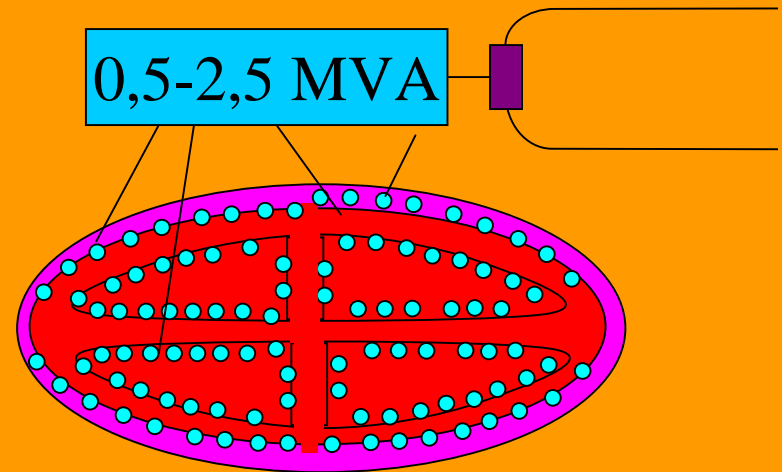
TV and
Telephone
cables



New Concept of Low-voltage, Three-phase, 600-V Looped Network

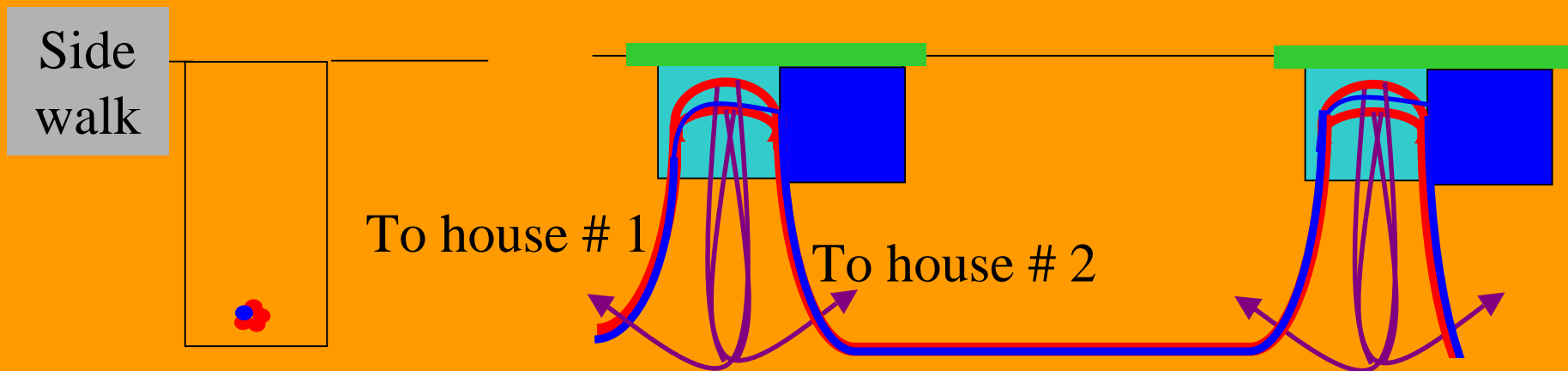


Medium-voltage system
located in peripheral of
living area



Proposed simplified infrastructure for underground

- Simplified cable plow approach with 1 cable (no trench to dig)
- Simplified connection box in two sections (power and multimedia)
- Each connection box serves two houses.

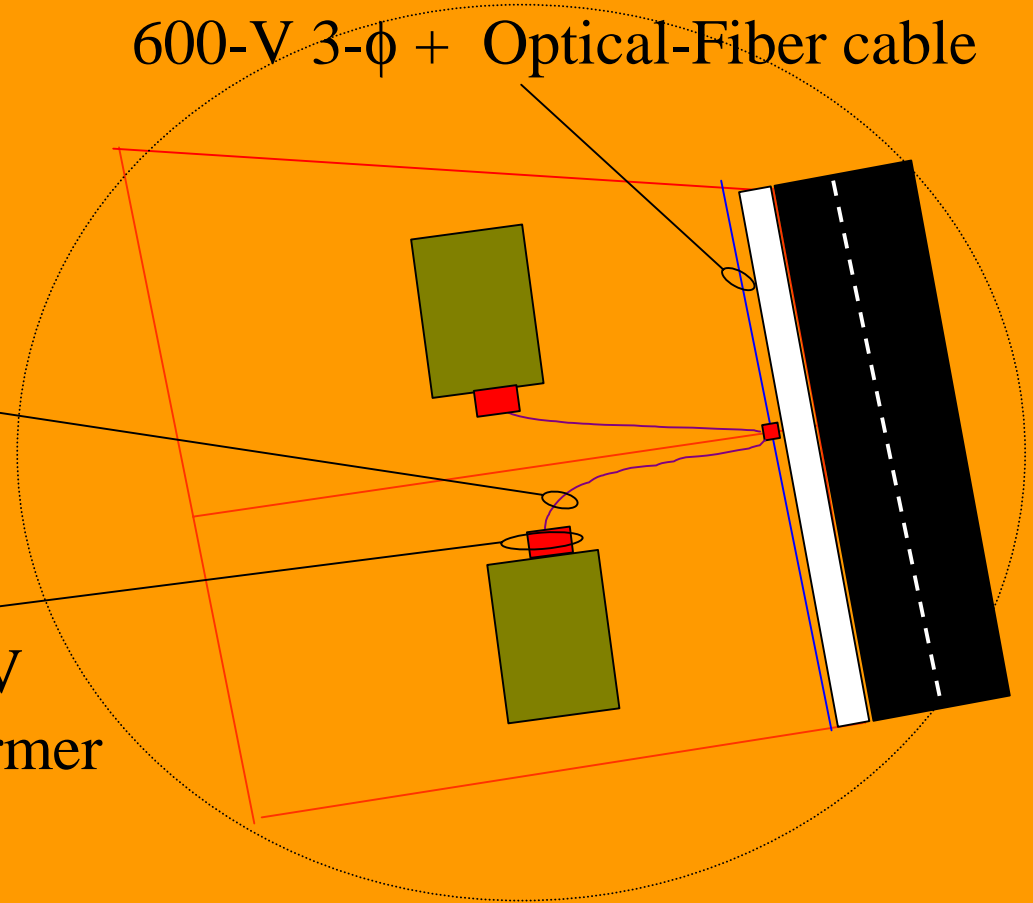


Combined Utilities to Houses

600-V 3- ϕ + Optical-Fiber cable

600-V and
optical fibers

600 V-120/240V
Electronic transformer



Cable Plow

- Up to 3 inches
- Up to 42 inches deep
- Speed action with vibration



Other Approaches Used in European Countries



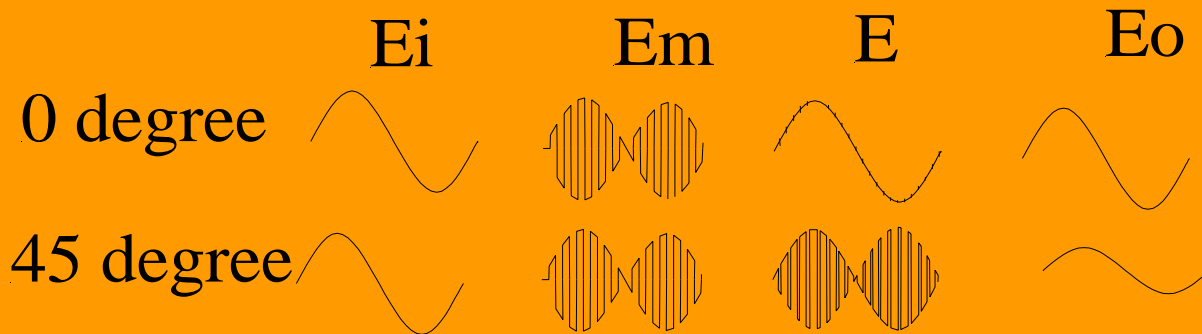
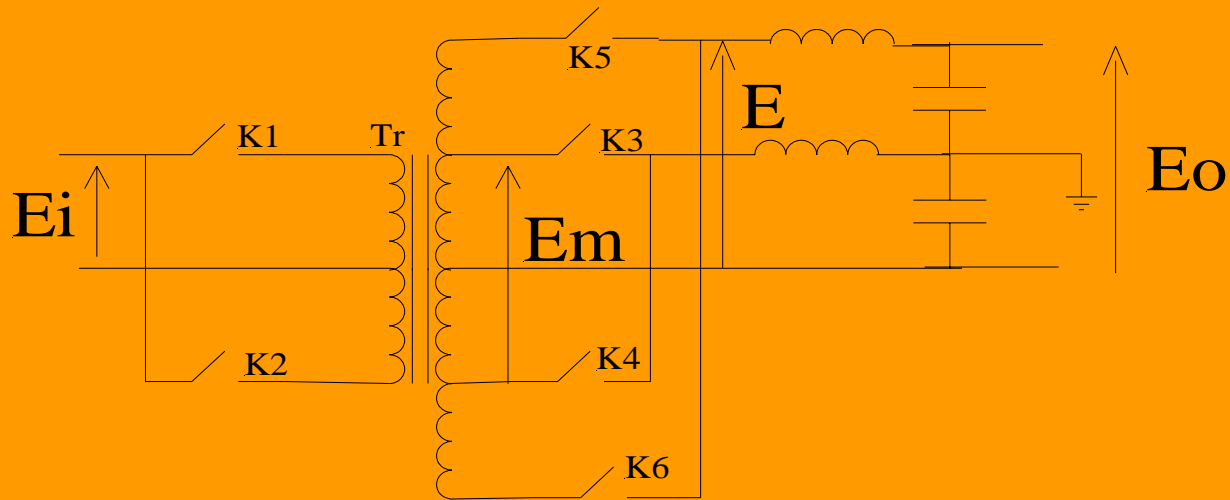
Sidewalk Approach



Electronic Transformer at the Main Entrance



Example of Electronic Transformer Topology



Why Intermediate Voltage Approach?

- It reduces the cable diameter in the trench. Modern cable plow can bury up to 3-inch diameter cable.
- Reduces the MV system and the related hardware.
- Simplifies the maintenance and the operation.
- Reduces the cost by 50%.

Economical issue for 247 customers

Type of power system	Actual practice (\$)			New approach (\$)		
Description	Quantity	Electrical	Infrastructure	Quantity	Electrical	Infrastru
Main transformer	17 X 100 kVA, 6 X 167 kVA	133 067	59 800	1 X 2,5 MVA	55 167	8 000
Electronic transformer	Not applicable			247 xfo 25 kVA	141 360	37 200
MV cable in living area	4 834 m	119 489	152 892	----0.00 \$----		
Low-votlage cable	6 010 m	182 125	256 256	6500 m	191 000	54 975
Connectors	476 barres	84 496		494 con.	3 458	
Cable drop	6000 m	311 243	295 412	5 115 m	265 334	24 618
Low-votlage protection	Not used			6	13 000	
Total		830 420	764 360		669 319	124 793
Grand total		1 594 780		794 112		
Difference			-50%			
Cost per customer		6 457\$		3 215\$		

Conclusions

- Simplification of cable plow that speeds the construction
- Reduction or elimination of MV system in living area resulting to reliability improvement
- 600-V system up to the house with the electronic transformer,

Conclusion

- Reduce the coordination between utilities during the construction
- Supply the three phase for apartment or commercial building

⇒ Important cost reduction

Questions ..