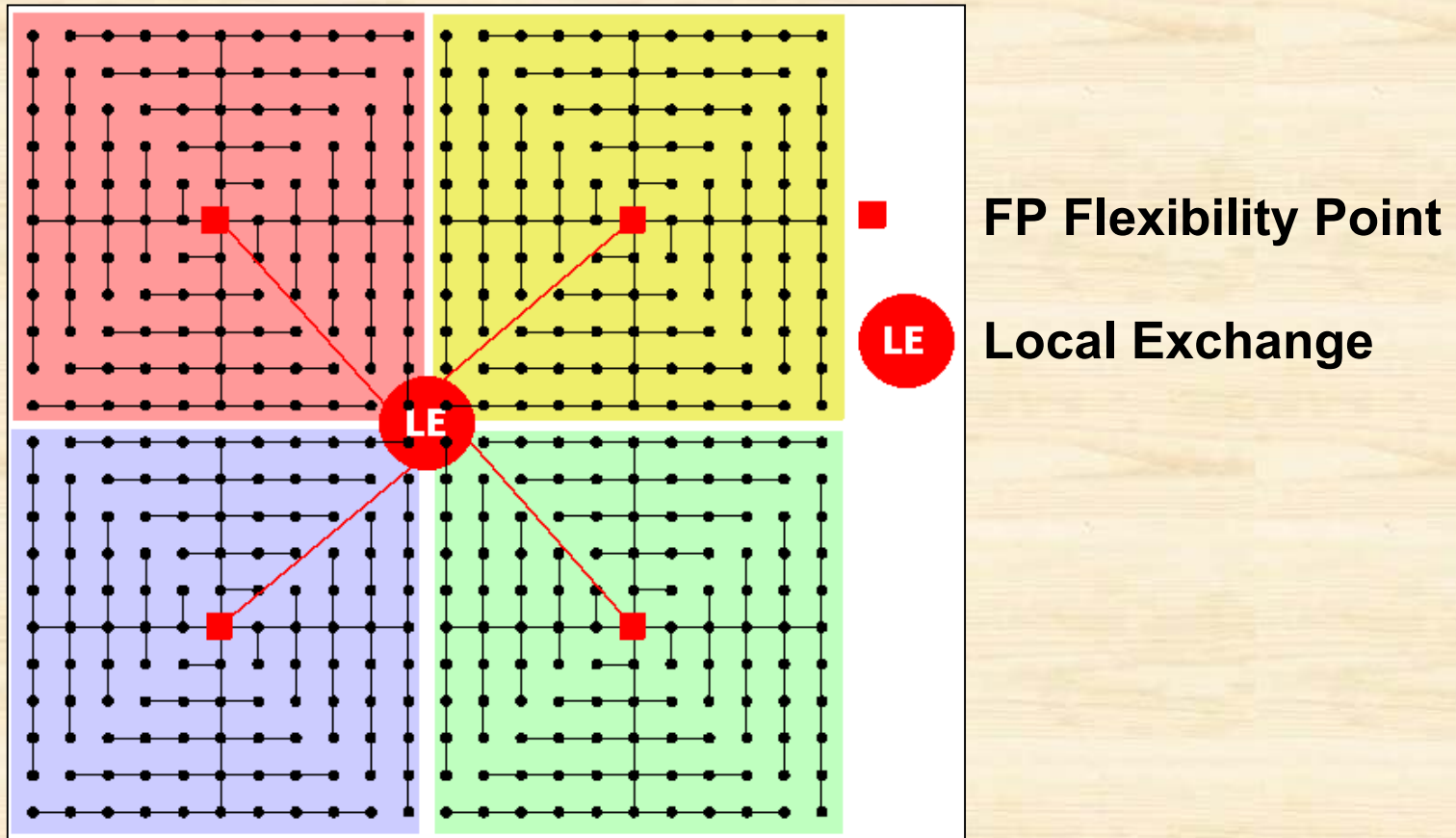
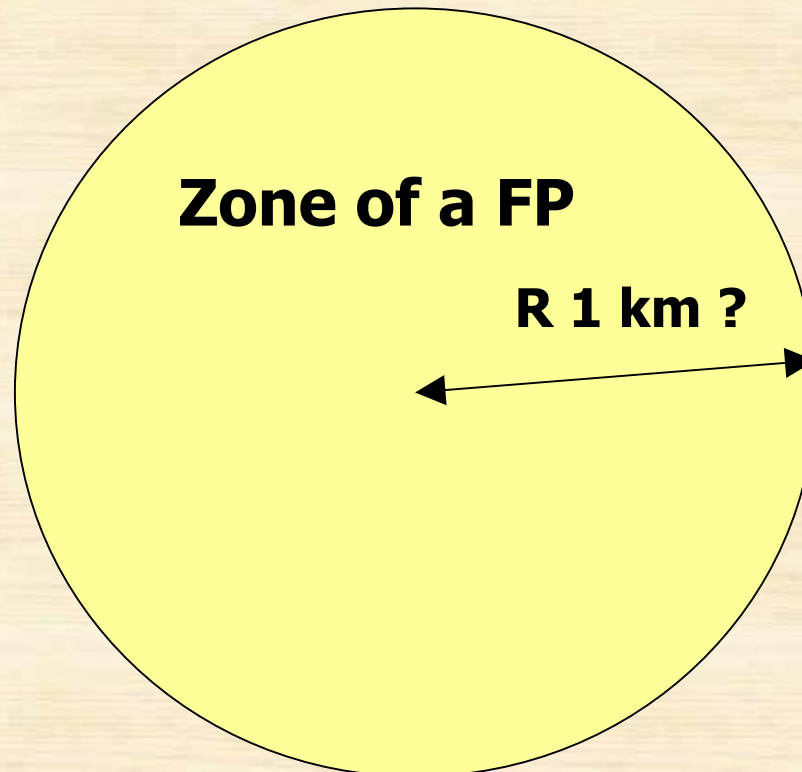


The impact of ring access  
network,  
For Business Customers  
On the shape of the Cable  
Network

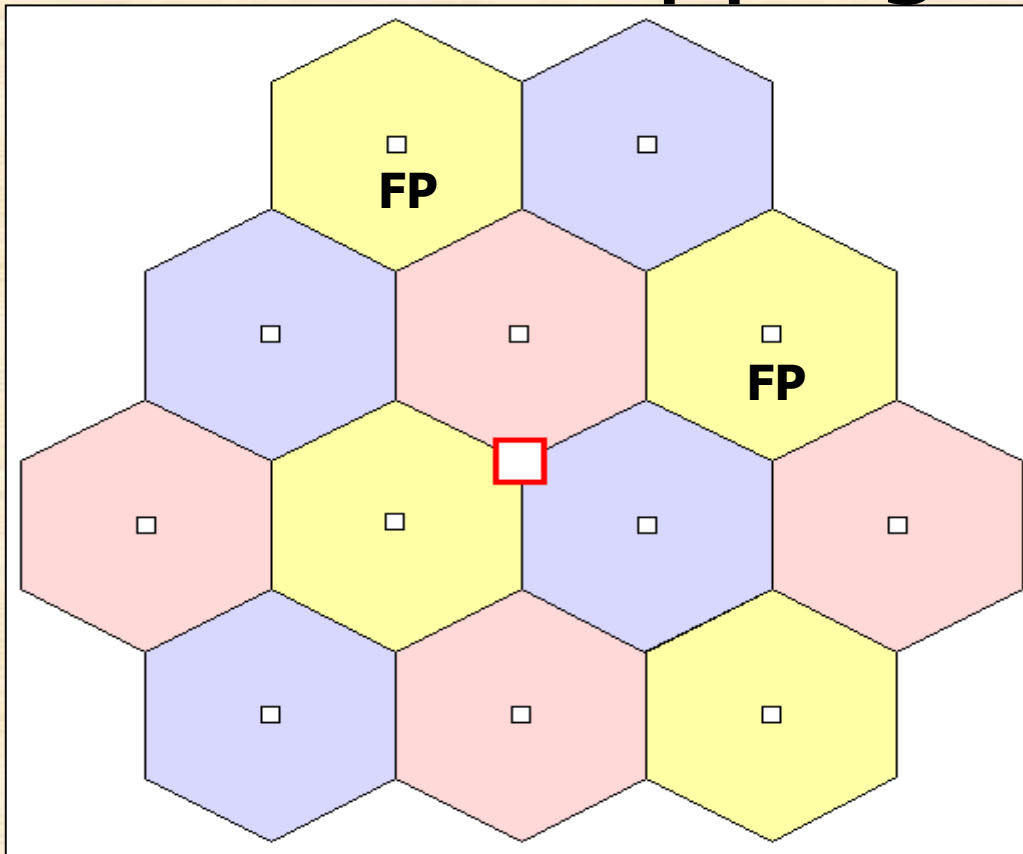
# The usual copper network



# The usual copper network (2)

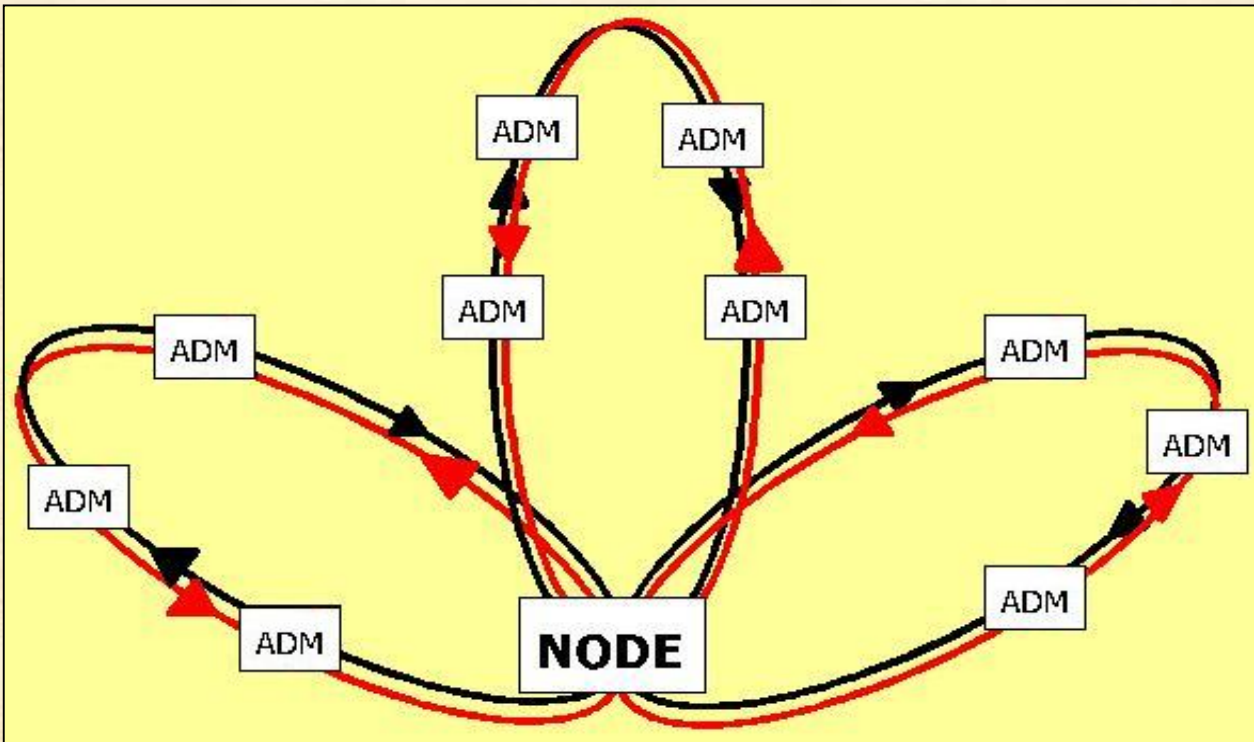


# The mapping of the FP



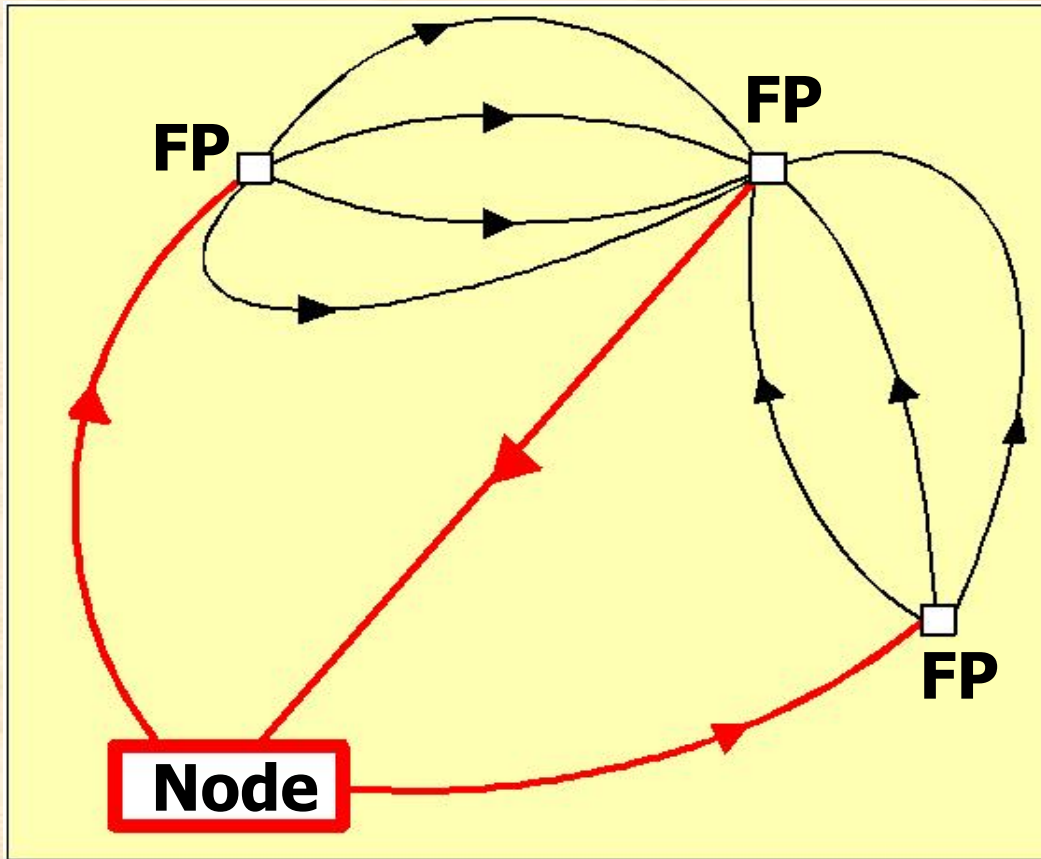
**For the copper network and the mobile network, the mapping of the FP or the BTS is often shown as on this pattern**

# Ring structure



This sketch is focussed on a SDH ring with some Add/Drop Muxes

## Addition of Flexibility Points in the Ring Structure



Share of the network  
between

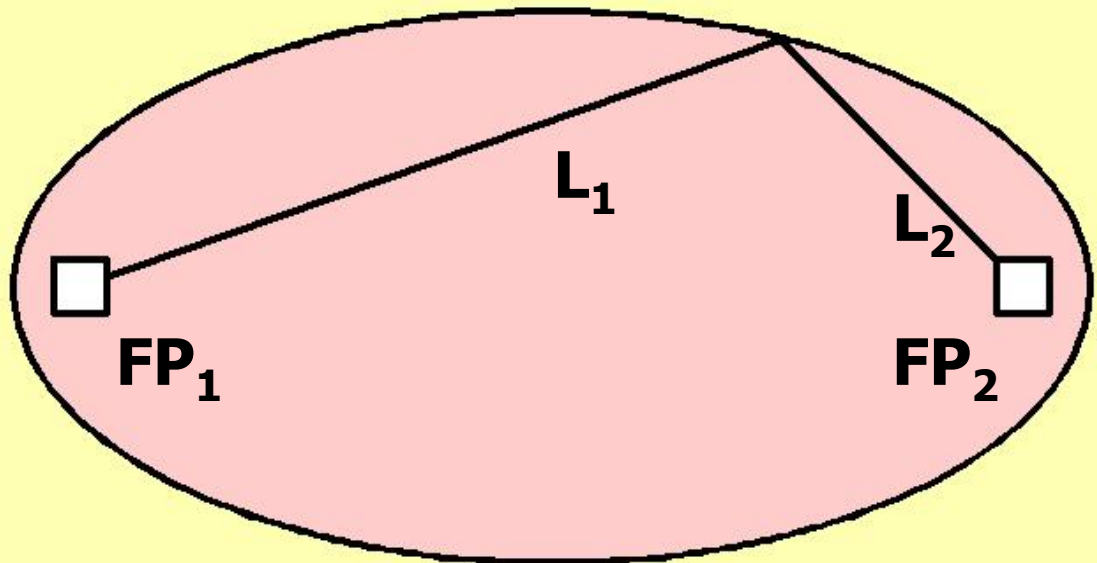
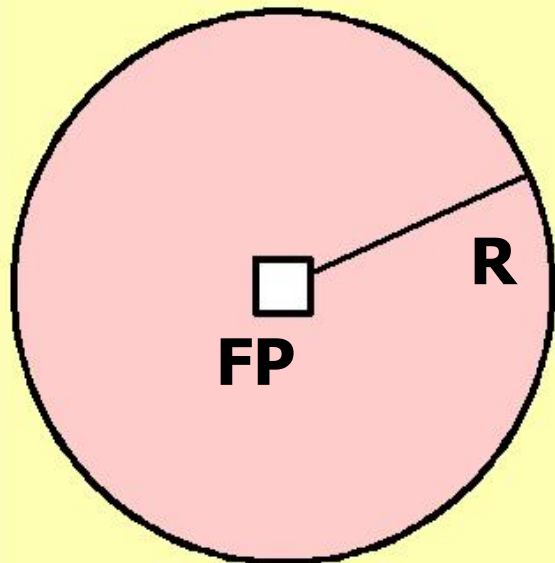
Transport : Node  $\leftrightarrow$  FP

Distribution : FP  $\leftrightarrow$  FP

Issue of way : from the node  
and to the node.

In a cable, management of  
the way of every fibre. (**Not  
so simple that on the  
sketch**)

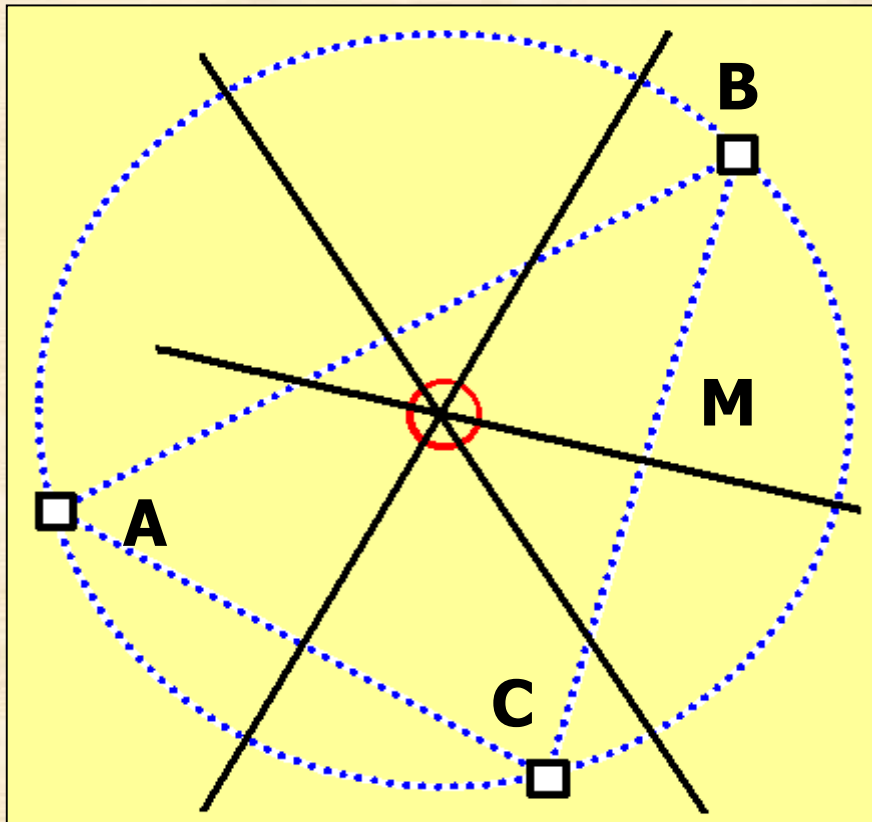
# The range of the FP or couple of FP



In a tree and branch local loop, servicing area of a FP : a circle

In a ring structure, servicing area of a couple of FPs : an ellipse

# Introducing a 3<sup>rd</sup> FP



What area will be covered by the couple B-C, C-A and A-B ?

Covered by BC :

$$MB+MC < MC+MA$$

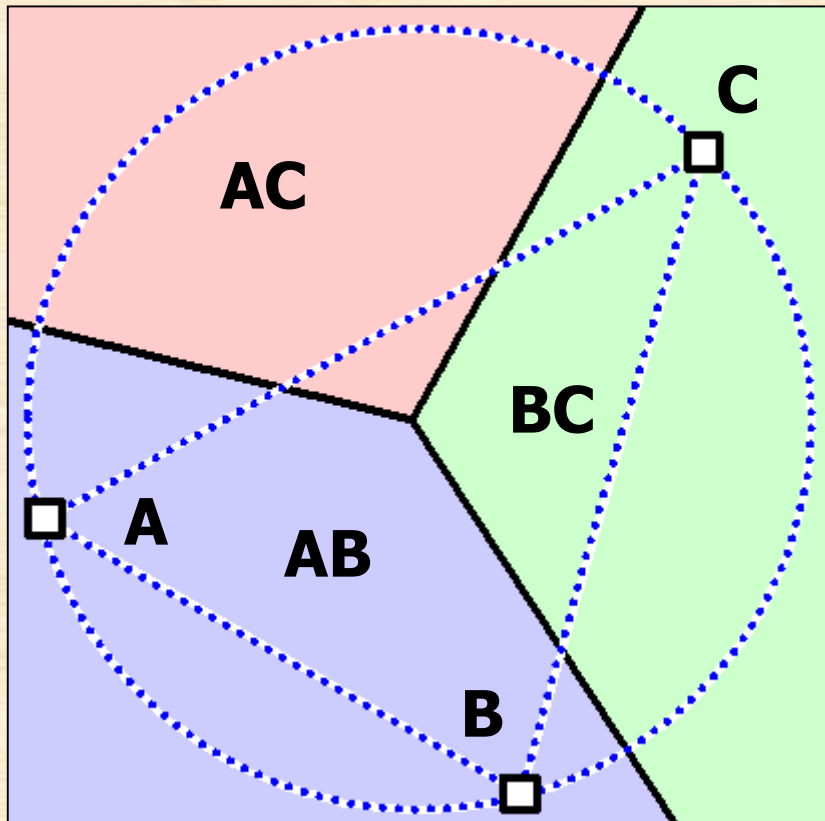
$$MB+MC < MA+MB$$



$$MB < MA \text{ \& \ } MC < MA$$



# Introducing a 3<sup>rd</sup> FP (2)

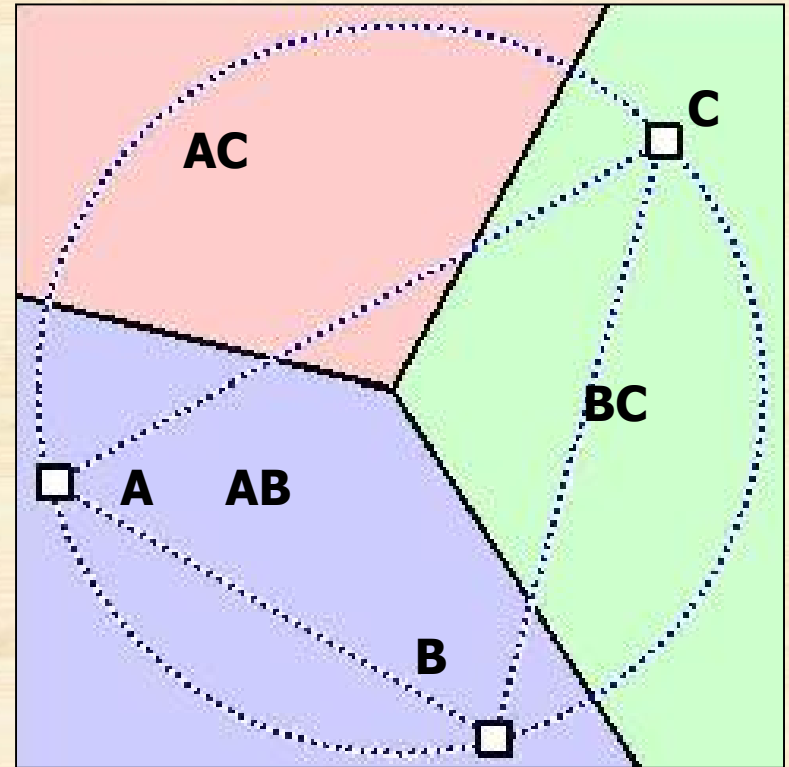
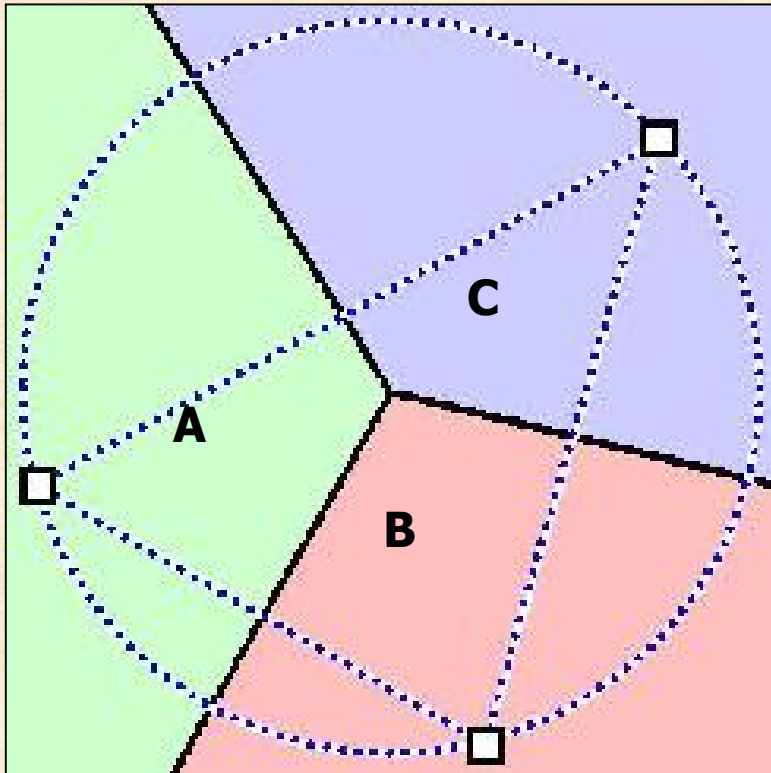


We find an unexpected allocation of space

Some comments :

- The area AC does not include a large part of the segment AC
- If the angle B is obtuse, the area AC does not include any part of the segment AC

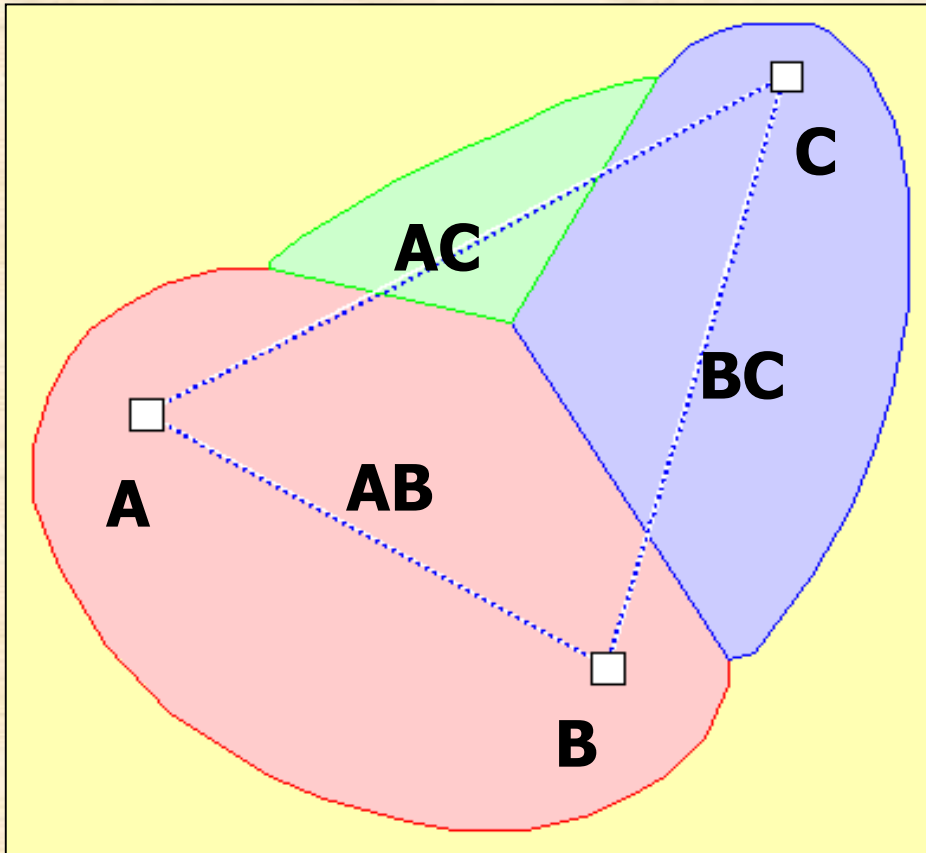
# Comparison of Tree/Ring



# Comparison of Tree/Ring

- The limits are in both architectures the medians
- But the sectors defined are opposite

# Introducing a 3<sup>rd</sup> FP (3)



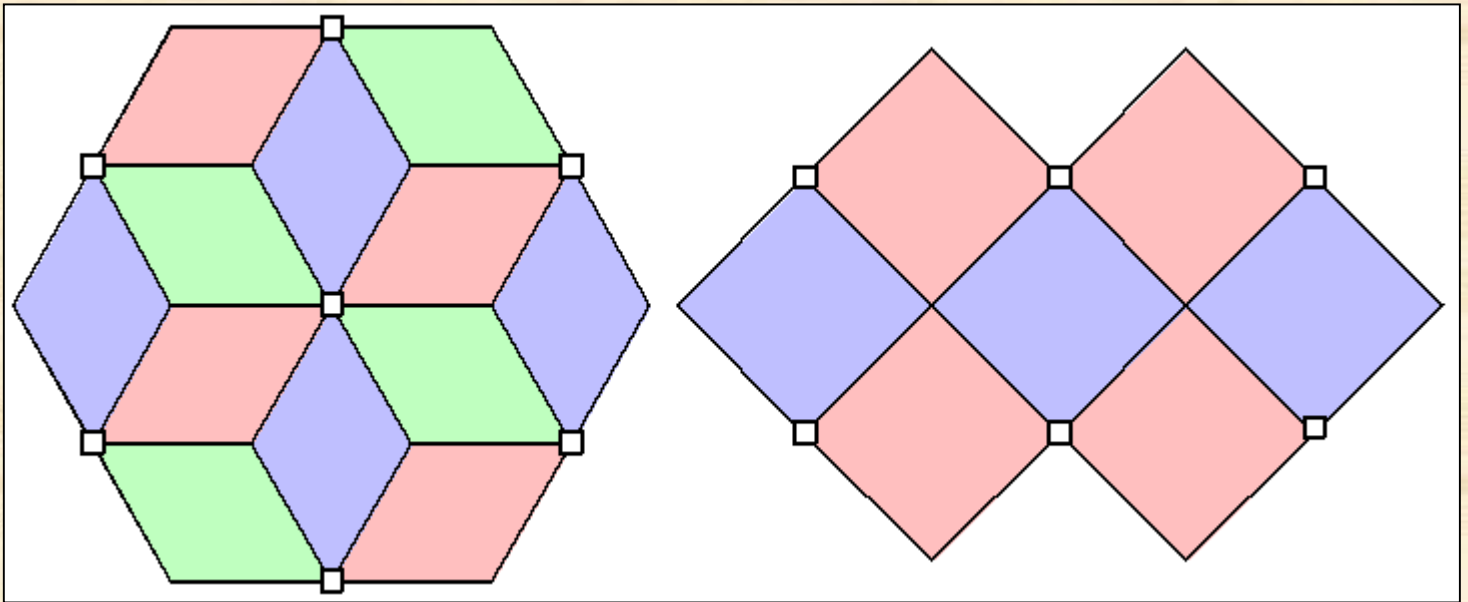
**We come back to ellipses**

**The centre of the circle ABC (radius =R) is on every ellipse**

**For every area, the total distance for joining both FP is less than 2R.**

**You see the poor area AC**

# Organisation of FPs

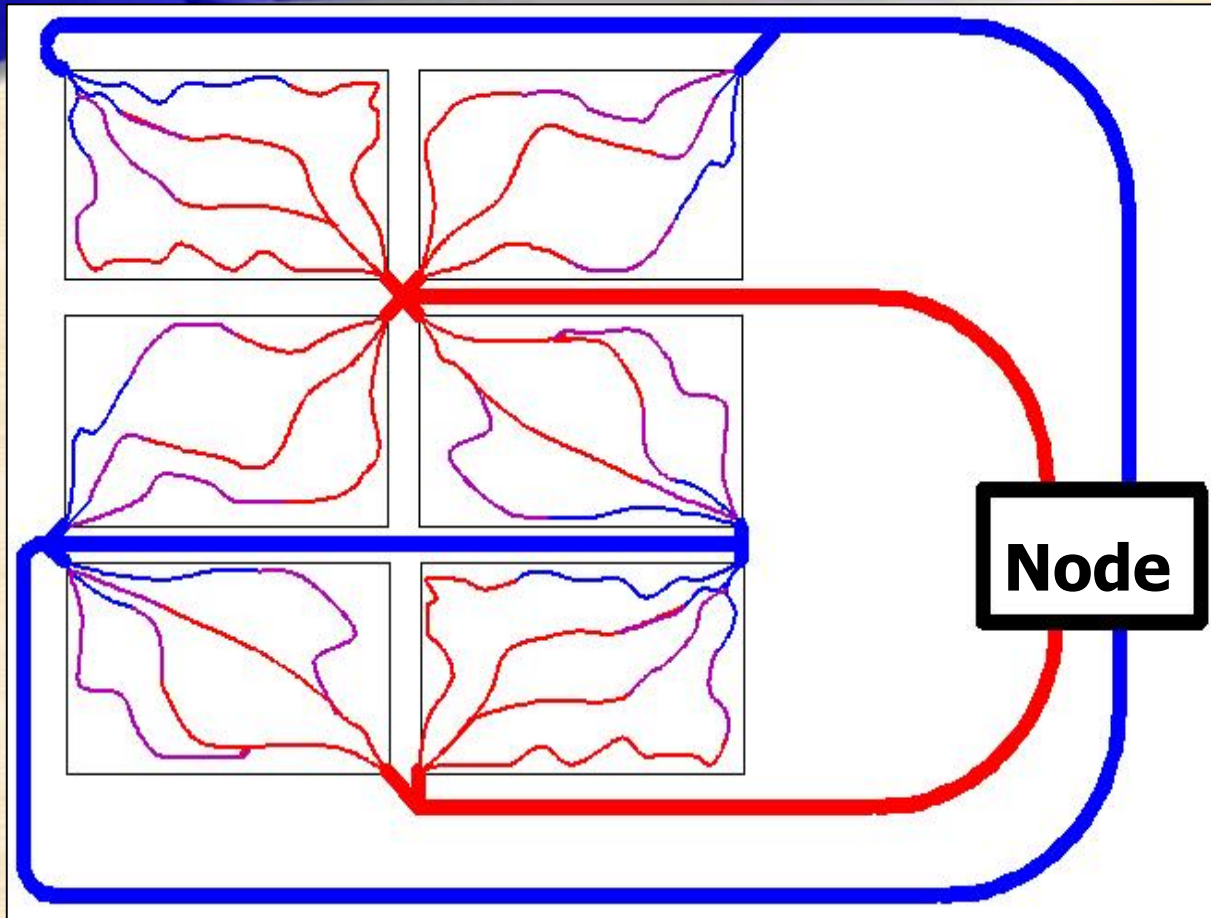


Instead of the hexagon and square, we have some patterns a little bit different, and useful for modelisation

# Conclusion

- For more FPs, the drawing is tedious for few results.
- One result : when you have an obtuse angle B in a triangle ABC, a cable between A & C is generally of no use.
- A number of questions are in consideration and depend on the specific topology of the area :
  - **What is the optimal distance between the FPs, with the density of customers ?**
  - **Or what is the number of customers in an area ?**
  - **Be the transport cables one way or two ways ?**
  - **Optimum number of ADMs in a ring ?**

# Post conclusion



The capillaries : complicated network. Transport is simple.

Size of the capillary network ? Addition of FP allows having smaller capillarity network.

In a ring, you have two fibres, one clockwise, the other in trigonometrically way.

## Thank you