MOB course problem A.
Cost reduction using network sharing

Problem background:

Two operators will deploy new wireless networks for there customers in an area and they want to investigate the potential benefits of network sharing of two different types

1. Geographical split
2. Shared sites

About coverage and deployment strategies

Coverage
The whole area 1km *1km should be covered at year 1.

Own network
Each operator builds its own network over the full area in order to serve own users only.

Geographical split
Each operator builds half of network, i.e. 50% of the sites that are fully equipped in order to the serve the demand of both operators. The users of one operator will then be "roaming" users of the other operator. .

Shared sites
The operators jointly build base station sites which are used by both operators but each deploys and uses own radio equipment.

Your problem:

Calculate the total cost of investments and the potential cost savings using the two types of network sharing, "geographical split" and "common shared network".

Provide answers for both "low" and "high" demand predictions; see below.

Part 1:
Do the calculations for year 1 using the RAT technology "COMA-1"

Part 2:
Repeat the calculations assuming that the operators start the deployment year 2 when the RAT "COMA-2" with enhanced performance is available.

Demand predictions

The user distribution is assumed to be homogeneous in the area. The operators have 50% market share in the area. Two levels of demand predictions are considered ("low"/"high")

Type of demand prediction	Number of active users in the whole area	average user demand during "busy hours"
"Low"	2000	20 kbps per user
"High"	4000	100 kbps per user

RAT descriptions

The operators have agreed to use the highly modular COMA technology (Corner Optimized Molto-Accesso) with the good property to produce coverage areas shaped as perfect squares. The micro base station can be configured with a number of carriers.

Type of Radio Access Technology	Coverage (square km)	Number of carriers	Capacity per carrier	Availability
COMA-1	0,01	1 – 4	1 Mbps	Year 1
COMA-2	0,01	1 – 8	2 Mbps	Year 2

Price list

	Price
Deployment and Site build out	
Non-telecom equipment	9 k€ per site
Construction	5 k€ per site
Installation	6 k€ per site
Radio equipment	
COMA-1 TRX, the first carrier	10 k€ per carrier
COMA-1 TRX, additional carrier	10 k€ per carrier
COMA-2, the TRX first carrier	10 k€ per carrier
COMA-2 TRX, additional carrier	10 k€ per carrier
Running costs (per year)	
Site leases	6 k€ per site
O & M	4 k€ per site
Electric power	1 k€ per carrier per site
Leased lines	1 k€ per carrier per site