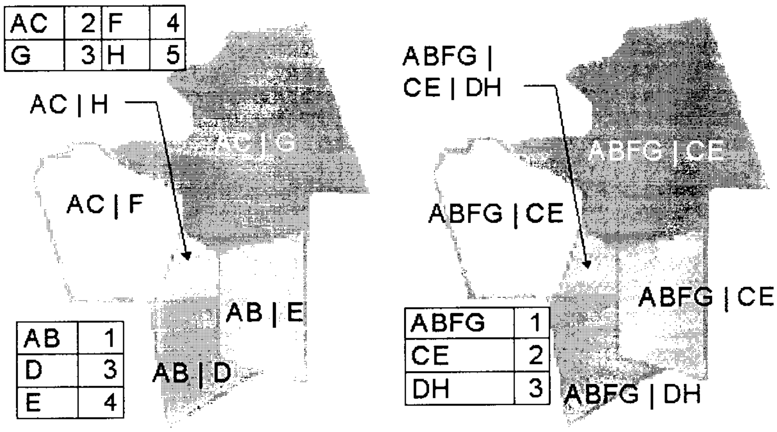


Figure 2: Two ensemble/block assignments.

capability of the DAB system. Actually, we found in random test series (see Section 7) that this effect arises very frequently.

# 4 Problem Formulation

It is well-known that the "classical" channel assignment problem in analog broadcast networks can be formulated as a (generalized) graph coloring problem. For this purpose, the network is given by a graph $G = (V, E)$ whose vertices $v \in V$ represent the transmitters. Two vertices $v$ and $w$ are connected by an edge $vw \in E$ if the corresponding transmitters may interfere. In the simplest case, a valid channel assignment then corresponds to a coloring $f$ of $G$ with colors taken from the set of available channels. This graph-theoretic model of channel assignment planning, which was introduced by Hale [10], has proved very useful since it allows us to represent arbitrary network structures arising in real-world problems, and not only the idealized regular grids which are still commonly employed in broadcast network planning by practitioners.

We have already pointed out that in DAB ensemble planning it is convenient to consider not single transmitters, but rather the (geographical) areas for which a certain service supply is planned. This puts us in full control of the subnets which should be considered as single entities transmitting the same ensembles over the same channels; we can always break down the model to the level of single transmitters if this is necessary. We make no additional assumptions about the (geometric) properties of the supply areas; thus areas may be connected or unconnected, may intersect or even contain each other. In practice, supply areas are usually described by collections of polygons on the earth's surface, and interference relationships are then defined using distance constraints. However, the graph-theoretic approach is also applicable to more realistic models which also take into account morphographic and topographic aspects, such as the models emanating from wave