Case study #	1.12
Title	TV interference problem due to telecommunication equipment
Type of trouble	Disturbance.
Source of trouble	Radiated emission.
System affected	TV receiver.
Location	Outdoors (near telecommunication centre or remote site).
Keywords	Radiated emission, TV receiver.
Version date	2008-02-29

System configuration

A TV interference problem occurred in the proximity of a building in which telecommunication equipment was installed.

A map of the location of this problem is shown in Figure 1.12-1, where the TV broadcast wave was propagating from the bottom-left to the upper-right domain. The TV receiver that experienced interference was installed just behind the building where the telecommunication equipment was set.

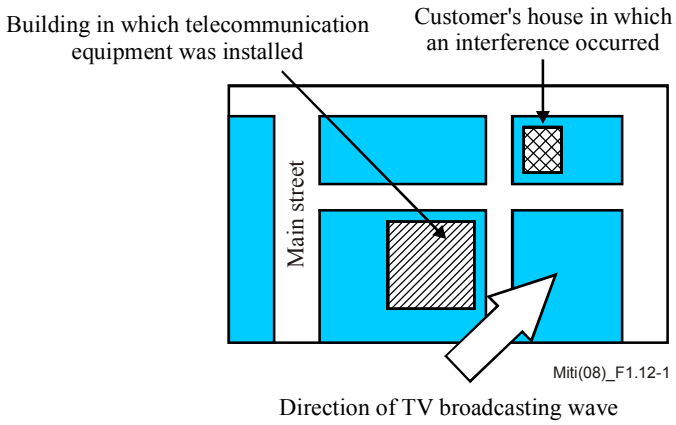

Figure 1.12-1 – Map of the EMI problem

Measurement/Searching techniques/Experiment

The customer claimed that stripes appeared on the TV screen in one TV channel. The broadcasting company investigated the cause of this EMI problem and found that the disturbance was due to EM waves radiating from the telecommunication building.

1 *Measurement of EMI source*

To find the source of this EMI problem, the following measurements were carried out:

a) TV broadcast signal level of the TV receiver, and

b) electric field distribution near the customer's house.

2 *Results of the measurements*

2.1 *Received TV signal level at the customer's house*

The received level of the TV broadcasting waves was measured with a spectrum analyser connected to a TV antenna at the customer's house. Figure 1.12-2 shows the measured frequency spectrum at the customer's house. An interference signal existed between the video and audio signal bands, and its level was about 22 dBμV. One can see that the D/U (desired/undesired) signal ratio was about 30 dB. From the experience of similar EM problems, the required level for the D/U ratio should be greater than 40 dB. Therefore, it was considered that this interference signal influenced the TV receiver, resulting in the generation of stripes on the screen.

2.2 *Measuring electric field distribution near customer premises*

Figure 1.12-3 shows the results of measuring the electric field distribution around this location. The results indicate that the highest electric field strength was observed near the building and that the measured level tended to decrease as the distance from the building increased.

2.3 *Measuring emissions near the telecommunication equipment in the building*

As a result, it was confirmed that the disturbance came from the building in front of the customer's house. The source of this interference was investigated and it was found that the interference signal radiated from transmission equipment in the building.

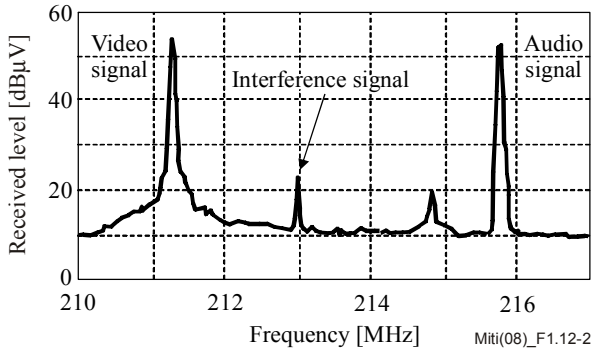

Figure 1.12-2 – Measured result of received signal level

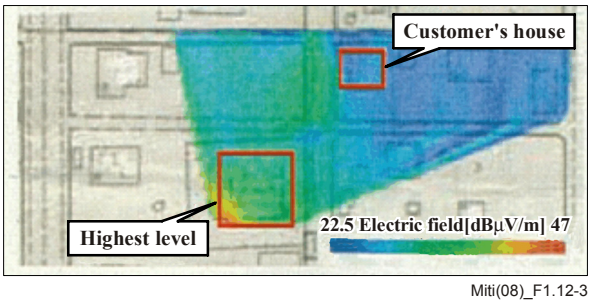

Figure 1.12-3 – E-field distribution near the customer

Mitigation method/Results/Conclusion

The following countermeasures were performed to reduce the interference signal from the telecommunication equipment:

a) covering the building wall with shielded sheets (see Figure 1.12-4), and

b) clamping ferrite cores on cables connected to the transmission equipment.

After taking these countermeasures, the level of the interference signal decreased from 22 dB to 11 dB. As a result, the D/U ratio became more than 40 dB and the TV interference disappeared (see Figure 1.12-5).

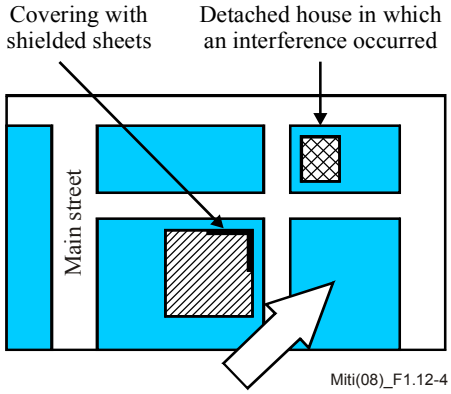

Figure 1.12-4 – Configuration of countermeasure

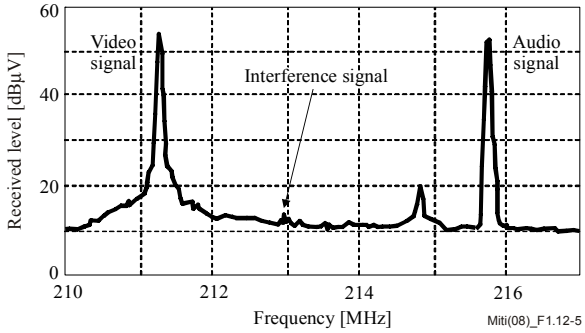

Figure 1.12-5 – Measured spectrum after countermeasures