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OUTLINE OF LECTURE 23: 14:00 Thu 30 Oct 08

We will continue to consider the highlights of the Power point presentation Physics, Networks and Standards In RFID.

The weak reply for passive tags is illustrated in slide 4.

An early long range (far field) passive tag for vehicle identification in shown in slide 5.

An early short range (near field) passive tag for waste bin identification in shown in slide 6.

Gates for the EAS function in a combined identity and EAS tag are shown in slide 7.

Four field and two material property vectors, and relations between them, are shown in slide 11.

The fundamental laws of electrodynamics are illustrated in slides 12 and 13.

Propagating electromagnetic fields are illustrated in slide 14.

We are reminded in slide 15 that some fields are propagating but some are just energy storage.

Illustrations of Gauss' and Faraday's laws are provided in slide 16.

Near and far fields of an electric dipole are illustrated in slide 17.

Mathematical expressions for near and far fields of a magnetic dipole are illustrated in slide 18, and their field measures are stated in slide 19.

The radian sphere concept is explained in slide 20.

Boundary conditions for important fields are illustrated in slides 21 and 22.

A backscatter tag circuit is shown and explained in slide 26.

Some relevant issues for such tags are stated in slide 27.

Some near field tags are shown slides 30 and 31.

Far field coupling theory is outlined in slides 37 and 38.

Slide 39 shows that effective areas for both small dipoles and half wave dipoles are about equal.

A warning on inappropriate oversimplification in far field coupling theory is given in slide 40.

Near field coupling theory is explained in slides 42 to 52. An illustration of the coupling volume for a planar coil antenna is given in slide 53.

An important conclusion on the optimum operating frequency for far field systems is given in slide 57.

There is following this section material on protocols. It is either of historical interest, (slide 72 to 80) or more detailed that is necessary to be understood (slides 82 to 108) for this course.

Some interesting illustrations of how spectra are managed to separate interrogation and reply signals are give in slides 109 and 110.

The Bode-Fano limit on how efficiently tags, which have input circuits with resistance and reactance, can be matched to sources is explained in slides 112 to 114.

A simple to manufacture RFID tag that has a matching circuit consisting of two capacitors is shown slide 115. Although the antenna can be well matched to the chip circuit there are significant dielectric and copper losses present.

A list of the important points made in the presentation is provided in slides 118 and 119. As has already been made clear, not all of these points need to be understood by students of this course.

PHC. 26 Oct 08.