Chapter 19
Expected Communications Technology to Track Avian Influenza and Related the Statement of Appeal by ITU-D SG2 Q14

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ABSTRACT

This paper points out some problems of telemetry for wild birds and future technical expectations to prevent Avian Influenza. For medium to large migratory birds, the data collection system aboard the NOAA meteorological satellites (the ARGOS system) has been able to map their migratory routes. However, recommended C/No for Doppler shift will be 54dBHz, while calculated required C/No for 400 bps data uplink is 36dBHz. The gap between navigation function and data communication will be almost 18 dB. The bird has to pay this overload. The authors provide a summary of the Statement that was adopted at the Rapporteurs meeting of the ITU-D SG2 Q14 (telecommunications for eHealth) in July 2008 and an account of anticipated developments in telecommunication technologies (satellite and RFID) based on meeting discussions, and strongly recommend the space agency to consider the importance of the advanced data collection satellite to track small birds.

1. PURPOSE

The ITU-D SG2 Q14 Rapporteur's Meeting for Telemedicine hosted by the Ministry of Internal Affairs and Communications of Japan was held at the Kokusai Bunka Kaikan in Tokyo on July 3–4, 2008. This meeting featured active discussions on the Statement of Appeal on an Integrated Information and Communications Network for Avian Influenza (commonly known as the Statement of Appeal on Avian Influenza), which was finally adopted after incorporating a wide range of suggestions and after repeated revisions. This report introduces a background of the events

DOI: 10.4018/978-1-4666-2794-9.ch019

that led to the Statement of Appeal and provides a summary of the Statement and an account of anticipated developments in telecommunication technologies based on meeting discussions.

2. BACKGROUND

2.1. Medical Perspective

Outbreaks of avian influenza caused by widespread transmission between birds, animals, and humans are believed to have inflicted a grave human toll from time to time, starting in ancient times.

The genes of the avian influenza virus are known to mutate rapidly, creating an obstacle to preventive strategies by hindering prompt identification of the respective antibodies for the antigen and vaccine preparation. Some researchers predict avian influenza may result in death rates of 50% in developing countries and 10% even in developed countries – alarmingly high compared to SARS, which recorded a death rate of 4%.

The influenza viruses that cause epidemics today once were highly fatal to humans; however, their pathogenicity has decreased over time.

Generally, mutations occurring in viruses found in carrier birds (geese, duck, sea swallows, etc.) during bird-to-bird transmission increase pathogenicity, producing new strains of avian influenza. The body temperature of the birds involved is considered to be one of the parameters affecting the process. The consensus view among experts is that it is simply a matter of time until bird-to-human transmission occurs from migratory birds carrying high-pathogenicity viruses. In nature, deaths among wild birds go unnoticed by human observation, and a major cause of such deaths may be the influenza virus.

Despite the importance of epidemiological monitoring in these biomes, no system has been established for real-time monitoring of avian influenza on a global scale. Such efforts would most likely fall under the jurisdiction of WHO, but since they would require the development of new technologies and since the regulation of frequencies and standardization of technologies is primarily the duty of the ITU, cooperation between the two organizations is crucial.

2.2. Ornithological Perspectives

Conventional studies of the migration of birds have been based on point data obtained from ID tags attached to the legs or necks of birds (geese, swans) by researchers and bird watchers, as shown in Figure 1. Since leg bands on small migratory birds are difficult to confirm visually, ID tags can only be read for animals caught in mist nets (LeMunyan, White, & Nybert, 1959; Cochran, Warner, & Tester, 1965; Lee, 1985; Green, Piersma, & Jukema, 2002).

For medium to large migratory birds, the data collection system aboard the NOAA meteorological satellites (the ARGOS system) has been able to map their migratory routes. Positioning of individual birds is made by attaching a 401-MHz transmitter to the bird and performing least-squares fitting on the obtained Doppler shift received by the low-orbiting satellite. However, the

Figure 1. Classical tracking method using neck-bands and leg bands (Nakajima, 2010)