Integrated Information Display for Air Traffic Control Applications

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Abstract

There are a large number of real time aircraft traffic displays, CCTV pictures, traffic overloading alerts, operational procedures/documents that are used by air traffic controllers to monitor and control the aircraft flying to or departing from the Hong Kong International Airport or flying within Hong Kong airspace. To allow the above information and/or data to be displayed, used or selected by the controllers in a quick and efficient manner, the Civil Aviation Department, together with its maintenance contractor, has developed in-house an Integrated Information Display System. This System contains all the above information/data and in addition relevant procedural and/or law documents, and provides a means to select up to six information pages for simultaneous display. The System has also been expanded for use by the senior management of the Department. This serves as a good example for applying Information Technology (IT) to facilitate and enhance the efficiency of air traffic control operations.

1. Introduction

With the robust growth in air traffic, the Hong Kong International Airport now handles around 750 flight movements a day and there is a daily average of around 350 flights overflying the Hong Kong Flight Information Region. It is expected that the above traffic will continue to increase.

With such dense traffic, there are a large number of real time information and/or data to be provided to the air traffic controllers to assist them to monitor, plan and control the aircraft flying to or departing from the Hong Kong International Airport or flying within the Hong Kong airspace.

In the past, nearly all the above information was provided on separate and dedicated displays, imposing a lot of strains to the controllers in viewing different displays in a short time. Thus, provision of an integrated information display system is considered essential.

2. Information/Data Sources

The principal information/data sources to be displayed for air traffic control include

the following:-

i) Radar display showing the 3D positions of the aircraft targets in space.

ii) Radar display showing the positions of the aircraft and vehicle targets on the airfield.

iii) Sector capacity display indicating the traffic loading for a particular control position in the coming hours for advance overloading alert.

iv) CCTV pictures for aircraft landing and/or manoeuvring on the airfield.

v) Meteorological Information including wind speed/direction and visibility on the airfield, etc.

vi) Runway capacity indication

vii) Operational procedures/documents including Manual of Air Traffic Control, Departmental Emergency Procedures, Aeronautical Information Publication, etc.

3. Development of Integrated Information Display System

To allow the above information and/or data to be displayed, used or selected by the air traffic controllers in a quick and efficient manner, the Civil Aviation Department (CAD) initiated a project in early 2005 to explore the possibility of developing an information display system that can integrate the above-mentioned information/data sources.

During the development stage, emphasis had been placed on the efficient transmission and processing of the real time information/data to minimise the delay in displaying this information/data. Thanks to the broadband network, the high speed PCs, the off-the-shelf software/licences, the CAD, together with its maintenance contractor (PCCW-HKT Telephone Limited), has developed in-house an Integrated Information Display System. This System contains all the above information/data and in addition relevant procedural and/or law documents (including the Air Navigation (Hong Kong) Order, etc), and provides a means to select up to 6 information pages for simultaneous display. Some typical displays are given at the attachment. Special focus has been paid to the human-machine-interface during the system design process to ensure an user friendly application.

In addition to the display of the required information/data, the System has also been equipped with a capability to monitor the radio-telephony communications between the pilots and a particular control position. The System therefore provides a convenient means to monitor and/or control the air traffic for Hong Kong.

The System has recently expanded for use by the senior management of the Department. A 24-hour news channel has also been included in the System to allow real

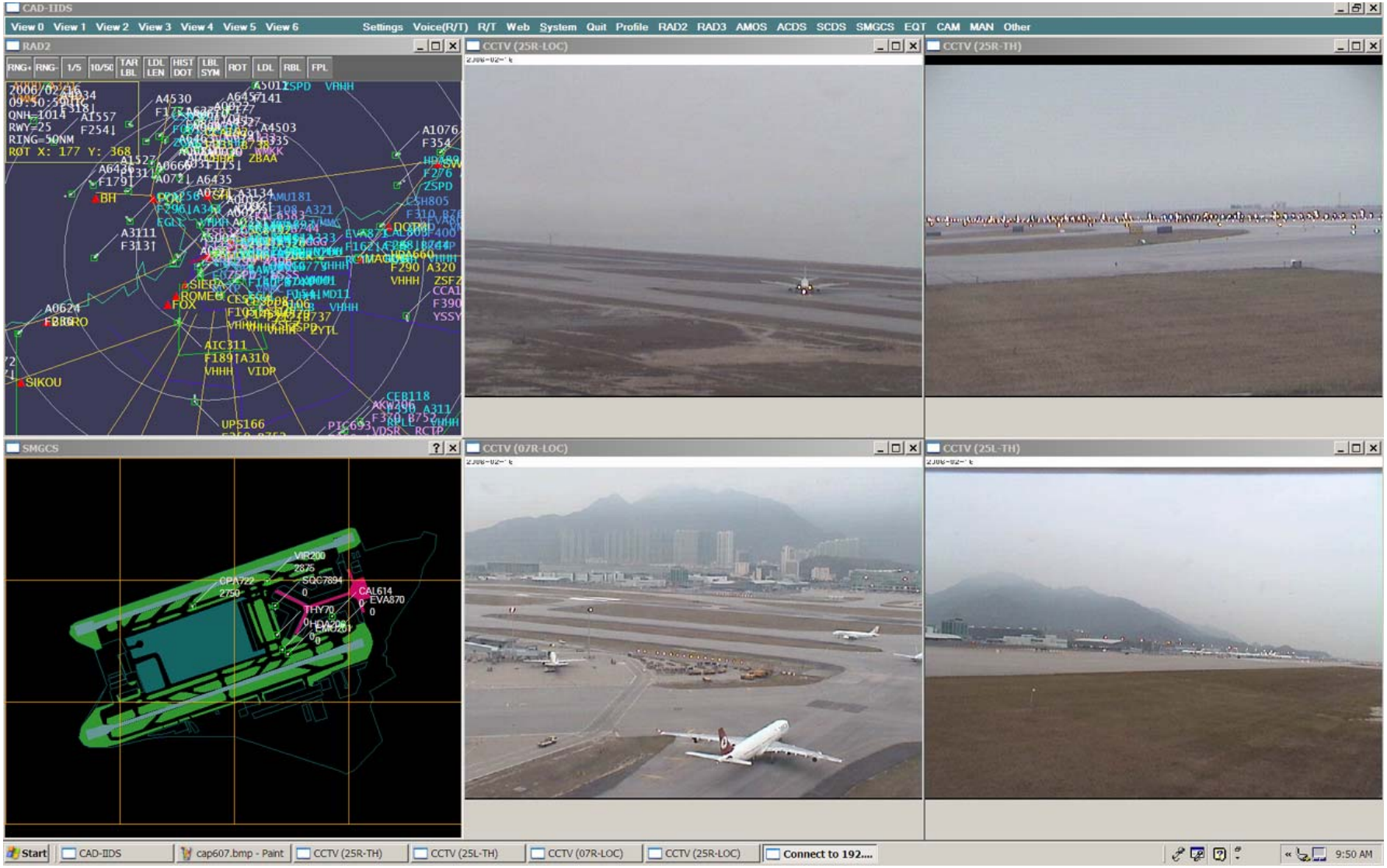
time monitoring of aeronautical occurrences either locally or globally. It is expected that more information and data will be connected to the System in the near future. Again, adequate capacity has been reserved in the System for such integration/expansion.

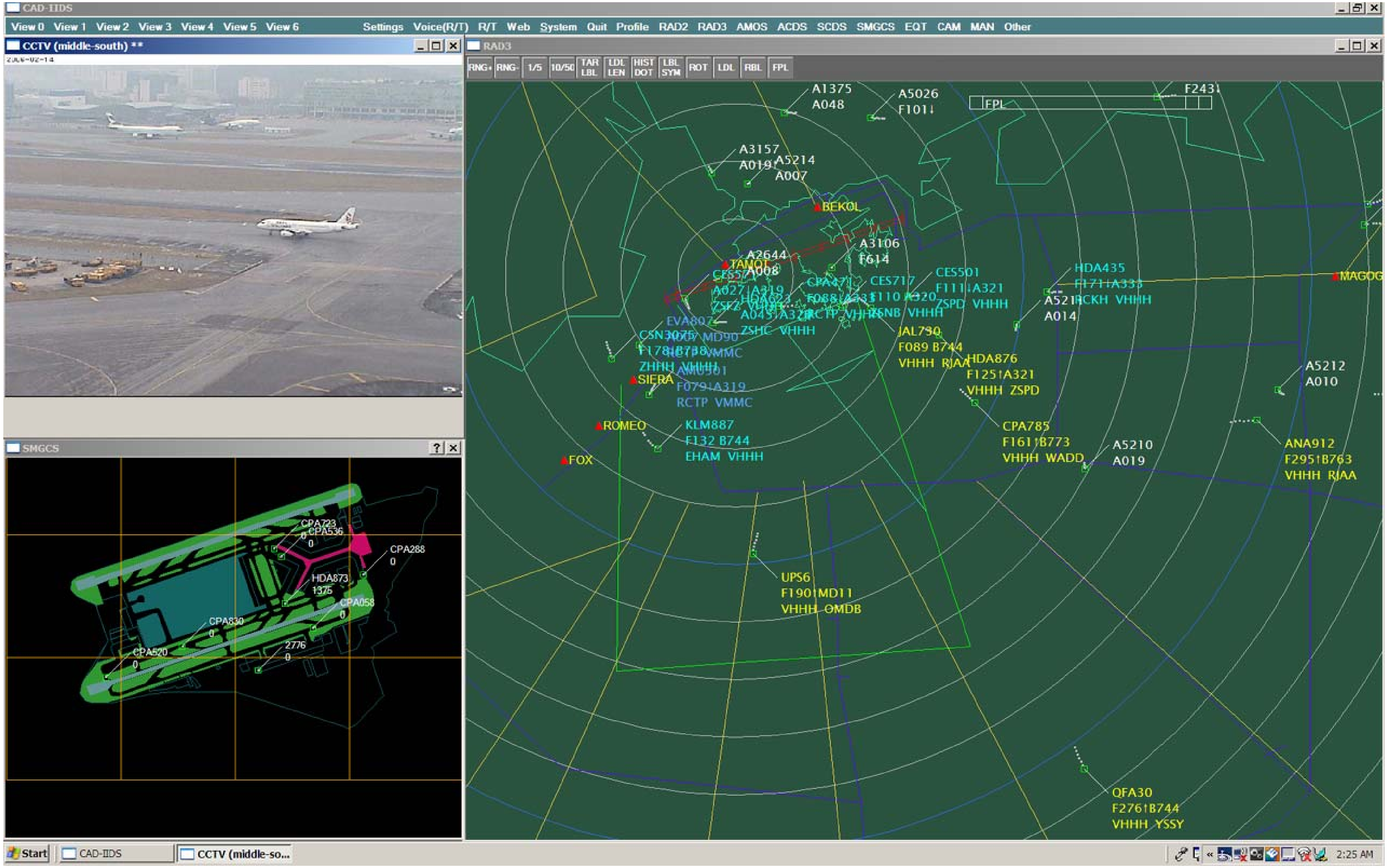
The System was commissioned in early December 2005 with an overall project cost around $1M.

4 Conclusion

Since the introduction of the above System, favourable comments have been received from the users. It is considered that the System will form the backbone of the CAD information display system, with more information/data to be incorporated in the future. This serves as a good example for applying Information Technology (IT) to facilitate and enhance the efficiency of air traffic control operations.

Attachment


CAD-IIDS
View 0 View 1 View 2 View 3 View 4 View 5 View 6
Settings Voice(R/T) R/T Web System Quit Profile RAD2 RAD3 AMOS ACDS SCDS SMGCS EQT CAM MAN Other
RAD2
CCTV (25R-LOC)
CCTV (25R-TH)
SMGCS
CCTV (07R-LOC)
CCTV (25L-TH)
Start
CAD-IIDS
cap607.bmp - Paint
CCTV (25R-TH)
CCTV (25L-TH)
CCTV (07R-LOC)
CCTV (25R-LOC)
Connect to 192....
9:50 AM


CAD-IIDS
View 0 View 1 View 2 View 3 View 4 View 5 View 6
Settings Voice(R/T) R/T Web System Quit Profile RAD2 RAD3 AMOS ACDS SCDS SMGCS EQT CAM MAN Other
CCTV (middle-south) **
RAD3
RNG+ RNG- 1/5 10/50 TAR LBL LDL LEN HIST DOT LBL SYM ROT LDL RBL FPL
SMGCS
A1375
A048
A5026
F101
F243
FPL
A3157
A019
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A008
TAMOT
CES501
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ZSPD VHHH
HDA435
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A521
RCKH VHHH
A014
MAGOG
JAL730
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VHHH RJAA
HDA876
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VHHH ZSPD
A5212
A010
SIERA
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ROMEO
KLM887
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FOX
CPA785
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VHHH WADD
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A019
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F295 B763
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UPS6
F190 MD11
VHHH OMDB
QFA30
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Start
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2:25 AM