Design and Implementation of Suggestion of Digital Circuit for Handover Checking Step Using Xilinx Technology

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Abstract

Wireless network attracted significant interest due to the capability to support the mobility. One of the main issues is the analysis and design of mobility functions, particularly the Handover management. In this paper a suggestion a mechanism to perform fast handover checking step in wireless networks for real time applications by design a digital circuit. The digital circuit was designed by using Xilinx technology.

1. Introduction:

One of the advantages of warless networks is the ability to provide mobility users versatile services when they are moving. To support mobility in wireless networks, two main tasks must be accomplished; Handover management and location management[1,2].

In the cellular network, the radio and fixed links required are not permanently allocated for the duration of a call. Handover, or handoff as it is called in North American, is switching of an on-going call to a different channel or cell.

There has been a lot of research into mobility support in wireless network.. Abdessadek A.. [1], was used softwork MARD model for specifying and modeling clearly and completely the GSM handover function.. Antonie [2],, was analyzed both micro mobility and inter sub-domain mobility handover and also he work under UDP protocol.. Jain [3], was considered tie slicing which utilized in implementing a soft Andover in DVB-H receiver. Lars [4], was proposed a protocol by combination of UDP with IETF. There are another research was worked into handover but not tall any think about checking circuit.

This work is focused on the checking step in handover function, which still affecting the performance of Global System for Mobile (GSM) Telecommunication network. Abdessadek [1] was explained the handover procedure.

This paper is organized as follow ; section 1 was introduction to handover, section 2 was described the suggestion circuits, section three was described the simulation results and the last section stated the conclusions points.

2. Suggestion of Digital Circuit and Algorithm for Checking Incoming Call Channel.

The step algorithm and their circuits are;

a-Divided all channels into 4 groups (may be more as required design) for reduce the checking time as follows;

Total number of channel TNC=100%

$TNC \div 2 = HTNC \Rightarrow 50\%$

$HTNC \div 2 = QTNC \Rightarrow 25\%$

$HTNC + QTNC = TFTNC \Rightarrow 75\%$

HTNC=50% of channels.

QTNC=25% of channels.
TFTNC=75% of channels.

The digital circuit which done this divided procedure is shown in figure (1); let the number of bit in each channel is 8-bit.

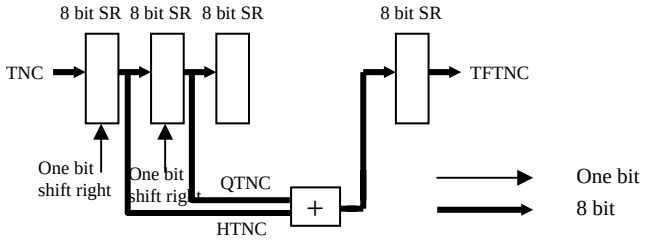

Figure (1) digital circuit which divided the total number of channel to the 4 group.

b- For checking the incoming channel (ch (8 bit)) of the mobile call in the new cell if its busy or not for change the channel or not. This can done by many steps; these are:

i) Check the incoming channel number lie within any one of the above group, and this step can done by the circuits as shown in figure (2). Let total number of channels are 100, and let the channel number in the new cell was represented by 7-bit for number and the most significant bit for singe the busy or not (where 1 for busy and 0 for not).

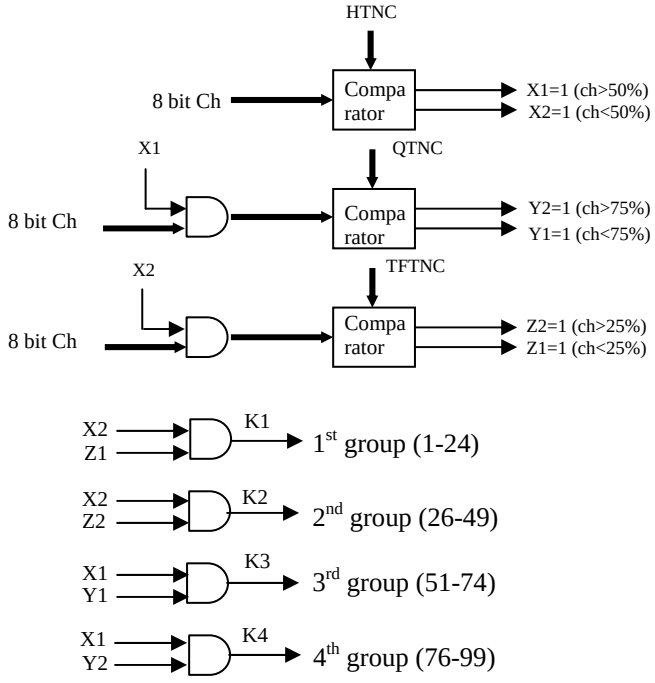

Figure (2) determine the incoming call channel in which group

In this algorithm was not use the channels which have the numbers (0, 25, 75, 100) but can be used it if want that for special channels or within the groups by simple change in the above algorithm.

ii) Then after determine the group , the exact number of incoming call channel within the group can determine by use the algorithm as the circuit shown in figure (3)

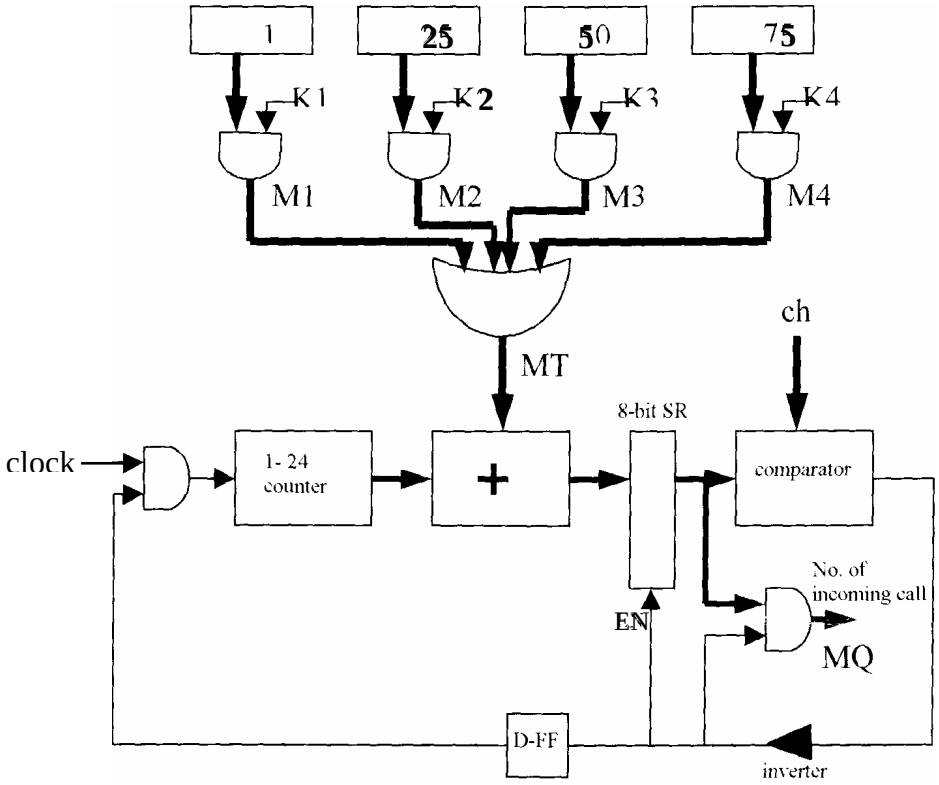

Figure (3) determine the number of incoming call channel

iii) Now after determine the exact incoming call channel number in the new cell. Let now determine if the same channel in the new cell is busy or not, let the number of channel is represented by 8- bit as above but the above algorithm was process 7-bit only and the most significant bit was remain for singe the busy or not (if it 1 mean the channel is busy and if it 0 mean the channel was not busy). The circuit in figure (4) was describe this process .

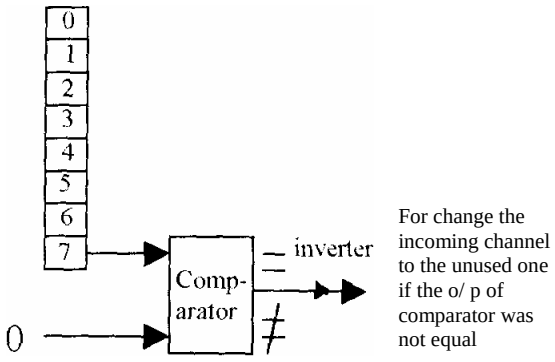

Figure (4) checking for deciding change the channel or not

Then, depend on the o/p of the comparator the call channel will be change or not.

c- The overall circuit implementation by Xilinx technology is shown in fig.(5)

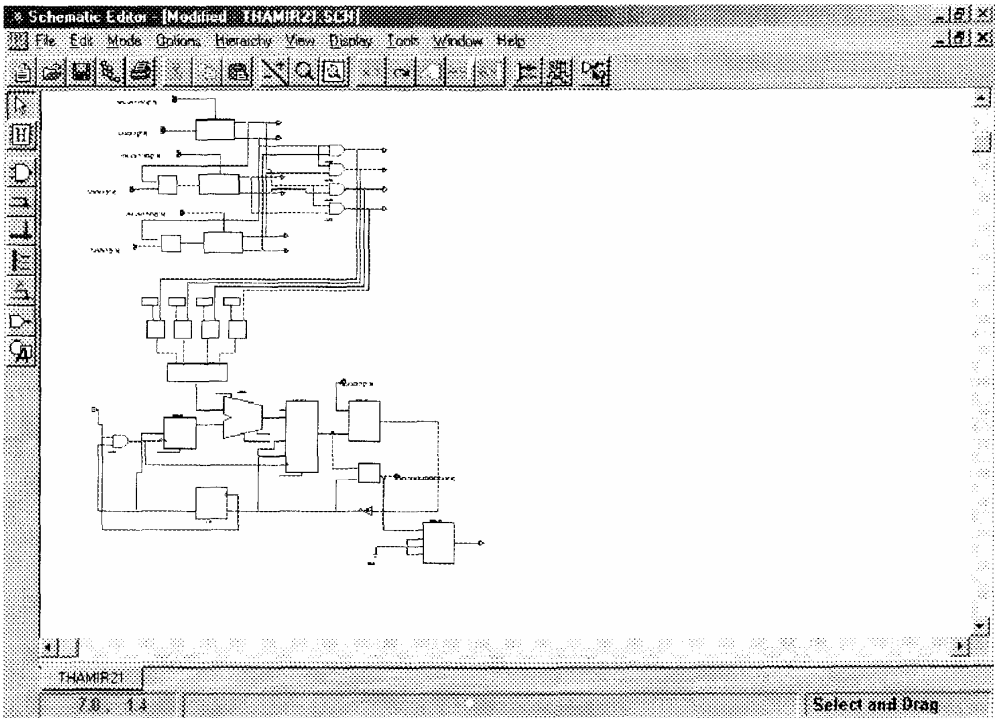

Figure (5) Overall circuit implementation by Xilinx technology

3- Results:

For simulate the above circuit was taken 4 incoming different channels. The assumption are :

Let the number of total channel (TNC) = 100 $(64)_{hex}$. Then HTNC = 50 $(32)_{hex}$, QTNC = 25 (19)hex and TFTNC = 75 (4b)hex. Then the 4 incoming channel numbers are [13 $(d)_{hex}$, 30 $(lE)_{hex}$, 60 $(3C)_{hex}$, and 80 $(50)_{hex}$] The results are in table (1)

Table (1) Simulation Results of the handover checking step

Incoming channel numbers (hex)	XI	X2	Y1	Y2	Z1	Z2	K1	K2	K3	K4	Ml	M2	M3	M4	MT	MQ
D	0	1	1	0	1	0	1	0	0	0	1	0	0	0	1	D
IE	1	1	1	0	0	1	0	1	0	0	0	19	0	0	19	1E
3C	1	0	1	0	0	1	0	0	1	0	0	0	32	0	32	3C
50	1	0	0	1	0	1	0	0	0	1	0	0	0	4B	4B	50

The waveform result simulation for one of the results in table (1) (the incoming channel number (0D) are shown in figure (6). Its clear from this figure the sequence of the operation. Form the simulation results the maximum clock for operation is 3 1 clock and minimum is 8 clock.

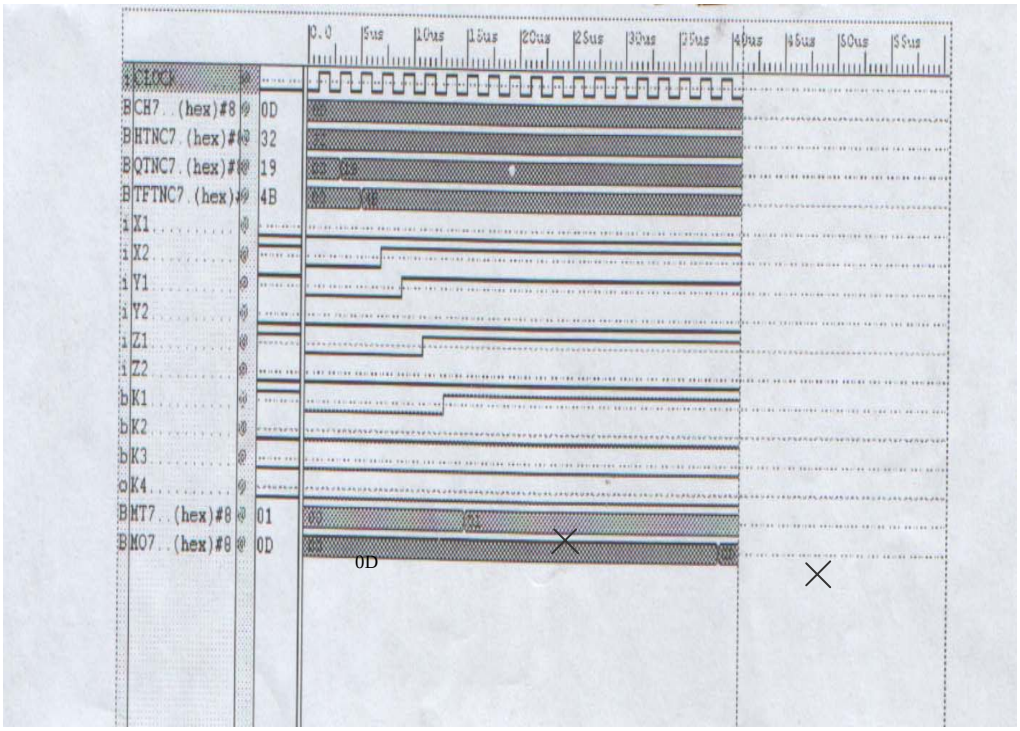

Figure (6) Simulation results for (13 $(0D)_{hex}$) incoming channel number

Then after determine the exact incoming channel number then check the last (most significant bit) bit if it is (1) then it mean the same channel in the new cell is busy this tend to change the call channel and if the last bit is (0) this means not busy and not need to change.

4- conclusions

There are many points can concluded, these are;

1. The checking for the incoming call in the cell from other is one of the important steps of handover procedure in mobile communication network for changing the call channel or not.
2. Can use this circuit in the high speed **ADC.**
3. Can use this circuit for any multi-channel wireless system.
4. Because use Xilinx technology the fast operation of circuit can satisfied.
5. Because the properties of the Xilinx technology such as wait size can satisfy the mobility of the checking center.
6. Can consider this work as the first step on this field and can developed it as the novel technology of Xilinx are gained.

5-References:

1-Adbessadek A. , Salah E. and Bouchaib B. "Design ofGSM Handover Using MARDS Model", University of Since & High School of Computer Sciences, Morocco, 2004.

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