Blast-Transition Domination for the ϑ - Obrazom of Zero Divisor Graph over Ring Zn

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Abstract: The hub of this article is a search on the behavior of the blast domination and the blast transition domination for the ϑ −obrazom of zero divisor graphs.AMS Subject Classification: 13A99, 13M99, 05C76, 05C69.

Key Words: Zero divisor graph, ϑ −Obrazom, Domination number, Connected domination, Blast domination, Blast transition domination.

I. INTRODUCTION

Among the most interesting graphs are the zero divisor graphs, their ϑ −obrazom graphs, because they involved both Ring Theory and Graph Theory. In order to discuss the zero divisor graphs we defined several key terms. A simple graph is a pair G = (V,E), where V is the vertex set and E is the edge set. In fact, V can be any finite set and E consists of unordered pairs {u, v} of distinct elements of V . When two vertices are connected by an edge they are said to be adjacent.[3]

Some graphs can be constructed with special elements of a ring R, where R is commutative and with an identity element. Let R be a Commutative ring with unit element and let Z(R) be its set of zero divisors. The zero divisor graph of R is denoted by $[\Gamma(Z(R))]$ and it is defined as follows: A two distinct vertices x and y are adjacent iff xy =0 for all x,y in Z(R)\{0}. All the graphs considered here are simple, finite, connected and undirected graph. The concept of the zero divisor graph was first introduced by I.Beck in 1988 and further developed by D.D.Anderson and M.Naseer.

Numerous researches emerged on the studies and applications of ϑ − obrazom. The importance of ϑ −obrazom stems from the fact that the ϑ −obrazom transformed the adjacency relations on edges to adjacency relations on vertices. Sheela Suthar and Om Prakash[12] introduced the covering of line graph of zero divisor graph over Z_n. G. Mahadeven et al., introduced the concept of blast domination number for ϑ −obrazom graphs [10].

We defined the connected domination transition number of a graph G as the difference between the connected domination and the domination number of G and is denoted as $\tau_c(G)$. Kaspar.S and Kulandaivel [9] introduced the concept of domination transition number of a graph. In this paper, we have established the blast domination of ϑ −obrazom of zero divisor graphs and their applications. Also we attained blast transition number of zero divisor graphs.

II. BASIC DEFINITIONS AND PRELIMINARIES

In this section, we discussed some basic definitions ,notations and their meanings

Definition 2.1[5]
A field is a commutative ring where every non-zero element ‘a’ is invertible. That is, if R has a multiplicative inverse ‘b’ such that ab = 1 then by definition, any field is a commutative ring.

Definition 2.2 [6]
A zero divisor of a commutative ring R is a non-zero element ‘r’ such that, rs = 1for some other non-zero element s of the ring R. If the ring R is commutative, then rs = 0 $\Leftrightarrow$ sr = 0.

Definition 2.3 [10]
ϑ −obrazom of G, denoted as L(G), is the graph with the vertex set E(G), where vertices x and y are adjacent in L(G) if and only if edges x and y share a common vertex in G. It is also called Line graph of G.

Definition 2.4[10]
A graph G is said to be triple connected, if any three vertices of G lie on a path.

Definition 2.5 [10]
A non-empty subset D of V of a non-trivial connected graph G is called a Blast dominating set (or) BD-set, if D is a connected dominating set and the induced sub graph $< V - D >$ is triple connected.

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The minimum cardinality taken over all such minimal Blast dominating sets is called the Blast domination number of G and is denoted by $\gamma_c^{tc}(G)$.

III. BLAST DOMINATION NUMBER FOR ϑ –OBRAZOM OF ZERO DIVISOR GRAPHS

In this section, we established the blast domination number of ϑ –obrazom of zero divisor graphs.

Example 3.1

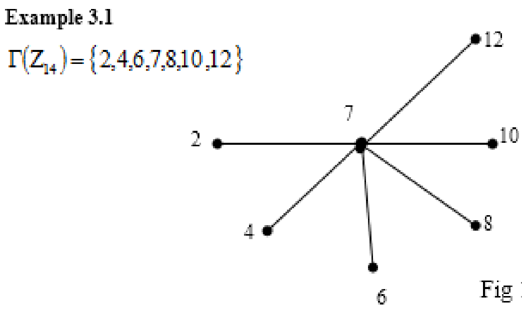

Fig 1. $\Gamma(Z_{14})$

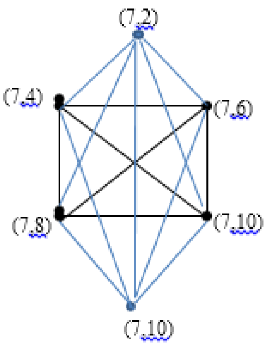

Fig2. $L(\Gamma(Z_{14}))$

Theorem 3.2

For the ϑ –obrazom of $\Gamma(Z_n)$ if $n = 2p$ where p is an odd prime number $p > 3$ then the blast domination number is one

Proof

If fix $n = 2p$, then $\Gamma(Z_n)$ is a star graph. So there is a common vertex which is adjacent to the other vertices. If we draw the ϑ –obrazom of $\Gamma(Z_n)$ for $n = 2p$, and let v_1 be the common apex of $\Gamma(Z_n)$ which is the end vertex of every edge of $\Gamma(Z_n)$. Then v_1 appears in every vertex of ϑ –obrazom graph, that is $[v_i, u_i] \epsilon L(\Gamma(Z_n))$.

Now fix the apex $[v_i, u_i]$ which is adjacent to every other vertices of $L(\Gamma(Z_n))$. It forms a complete graph. We know that the blast domination number of a complete graph is one [ie $\gamma_c^{tc}(L(K_n) = 1]$ .By this result it is factual. Therefore $\gamma_c^{tc}(L((\Gamma(Z_n))) = 1$ if $n = 2p$.

Theorem 3.3

For the ϑ –obrazom of $\Gamma(Z_n)$ if $n = 3p$ where p is an odd prime number $p > 3$ then the blast domination number is 2.

Proof 12

If $n = 3p$, then $\Gamma(Z_n)$ is a complete bipartite graph. Then there are two independent sets of vertices, one set has $p - 1$ elements which are multiples of 3 and second set has (3-1) elements which are multiples of p. In $\Gamma(Z_n)$, two vertices which are adjacent to all the other vertices but those two vertices are not adjacent to each other.

When we drew the ϑ –obrazom of $\Gamma(Z_n)$, fix the apex vertices $[u_1, v_1]$ and $[u_2, v_2]$ which are not adjacent to each other but $[u_1, v_1]$ is adjacent to $[u_1, v_i]$. Here v_i is multiple of 3. Similarly, $[u_2, v_2]$ is adjacent to $[u_2, v_i] \in V(L(\Gamma(Z_n)))$.

Since the apex vertices $[u_1, v_1]$ and $[u_2, v_2]$ are connected and their complements are lie on a path. Therefore, $[u_1, v_1]$ and $[u_2, v_2]$ form a blast dominating set. Thus, $\gamma_c^{tc}(L(\Gamma(Z_n)) = 2$ if $n = 3p$.

Theorem 3.4

For the ϑ –obrazom of $\Gamma(Z_n)$ if $n = 4p$ where, p is an odd prime number $p > 2$ then the blast domination number is 3.

Proof

If $n = 4p$, the vertex set of $\Gamma(Z_n)$ is $\{2,4,6,8 \dots, 2(2p - 1), p, 2p. 3p\}$ with $|V(\Gamma(Z_n))| = 2p + 1$. When we drew the ϑ – obrazom graph of $\Gamma(Z_n)$ .Let us fix the apex vertex $[u_i, v_i, w_i] \in L(\Gamma(Z_n))$.

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Now choose $[u_1, v_1, w_1]$, $[u_2, v_2, w_2]$ and $[u_3, v_3, w_3]$ in $L\left(\Gamma(Z_n)\right)$ which are not adjacent to each other but $[u_1, v_1, w_1]$ is adjacent to $[u_1, v_i, w_i]$ in $L\left(\Gamma(Z_n)\right)$. Similarly $[u_2, v_2, w_2]$ and $[u_3, v_3, w_3]$ are adjacent to $[u_2, v_i, w_i]$ and $[u_3, v_i, w_i]$. They are also connected and their complement $< V - D >$ is triple connected. Hence, $\gamma_c^{tc}(L(\Gamma(Z_n)) = 3$ if $n = 4p$.

Theorem 3.5

For the ϑ −obrazom of $\Gamma(Z_n)$ if $n = 5p$, p is an odd prime number $p > 2$ then the blast domination number $= \begin{cases} 2 & if\ p \le 5 \\ 4 & if\ p > 5 \end{cases}$

Proof

Case (i) If $p \le 5$, then there are two independent set of vertices in $\Gamma(Z_n)$ which are adjacent to all the vertices but not adjacent with each other. When we considered ϑ −obrazom of $\Gamma(Z_n)$, then one set has $p + 5$ vertices and the other set has $p + 1$ vertices in $L(\Gamma(Z_n))$. Let us fix $[u_1, v_1]$ and $[u_2, v_2] \in (L(\Gamma(Z_n))$ which are not adjacent to each other but $[u_1, v_1]$ adjacent to $[u_2, v_2] \in V(L(\Gamma(Z_n))$. Continuing the above process we found that these two vertices are connected and $< V - D >$ is triple connected. Hence they formed the blast dominating set. Thus, $\gamma_c^{tc}(L(\Gamma(Z_n)) = 2$ if $p \le 5$.

Case (ii)

Let $n = 5p$ where p is an odd prime number and $p > 5$. The $V(\Gamma(Z_n)=\{5, 10, 15, \dots, 5(p-1), p, 2p, 3p, 4p\}$.

Decompose the vertex set in to the following disjoint subsets.

$$S = \{5, 10, 15, \dots, 5(p-1)\} \text{ and}$$

$$M = \{p, 2p, 3p, 4p\}$$

Now we can draw the ϑ −obrazom of $\Gamma(Z_n)$ such that $V(L\left(\Gamma(Z_n)\right) = (p,5), (p,10), (p,15), \dots, (,5(p-1)), (2p,5), (2p,10), \dots, (2p,5(p-1)), (3p,5), (3p,10), \dots, (3p,5(p-1)), (4p,5), (4p,10), \dots, (4p,5(p-1))\}$.

Decompose these vertex into into disjoint subsets

$$K = \{(p,5), (p,10), (p,15), \dots, (p,5(p-1))\}.$$

$$L = \{(2p,5), (2p,10), (2p,15), \dots, (2p,5(p-1))\}.$$

$$M = \{(3p,5), (3p,10), (3p,15), \dots, (3p,5(p-1))\}.$$

$$N = \{(4p,5), (4p,10), (4p,15), \dots, (4p,5(p-1))\}.$$

Let us choose and start with any one of the apex vertices corresponding to $\left(L(\Gamma(Z_n)\right)$.

Now presume and fix $\{(p,5), (2p,5), (3p,5), (4p,5)\}$ which are adjacent and connected. Also its complement is triple connected. Therefore the result holds and it formed the blast dominating set. Therefore $\gamma_c^{tc}(L(\Gamma(Z_n)) = 4$.

Theorem 3.6

If $n = pq$, where p *and* q odd prime numbers and $p < q$, then the ϑ −obrazom of $\Gamma(Z_n)$ has an even blast domination (i.e the blast domination number is even).

Theorem 3.7

For the ϑ −obrazom of $\Gamma(Z_n)$ if $n = p^2$ where p is an odd prime number then $\gamma_c^{tc}(L(\Gamma(Z_n)) = \begin{cases} 2 & if\ p = 5 \\ 3 & if\ n = 7 \end{cases}$

Theorem 3.8

if $n = p^2 - 3$ then $\gamma_c^{tc}(L(\Gamma(Z_n)) = 1$ with $p < 11$ where p is an odd prime number.

Theorem 3.9

if $n = p^2 - 5$ then $\gamma_c^{tc}(L(\Gamma(Z_n)) = 3$ with $p < 11$

where p is an odd prime number.

Theorem 3.10

if $n = p^2 - 4$ then $\gamma_c^{tc}(L(\Gamma(Z_n)) = \begin{cases} 2 & if\ p = 5 \\ 3 & if\ n = 7 \end{cases}$

where p is an odd prime number.

IV. BLAST TRANSITION DOMINATION NUMBER FOR ϑ −OBRAZOM OF ZERO DIVISOR GRAPHS

In this section, we discussed the blast transition domination number for ϑ −obrazom of zero divisor graphs

Definition 4.1

Let G be a connected graph. The blast transition domination number is defined as the difference between the blast domination number and the domination number of the graph G and is denoted by $\tau_c^{tc}(G)$. Symbolically,

$\tau_c^{tc}(G) = \gamma_c^{tc}(G) - \gamma(G)$.

Theorem 4.2

For $L(\Gamma(Z_n))$ if $n = 2p$ where p is an odd prime number $p > 3$ then the blast transition number is zero.

Theorem 4.3

For $L(\Gamma(Z_n))$ if $n = 3p$ where p is an odd prime number $p > 3$ then the blast transition number is zero.

Theorem 4.4

For $L(\Gamma(Z_n))$ if $n = 4p$ where p is an odd prime number $p > 2$ then

$$\tau_c^{tc}(L(\Gamma(Z_n))) = \begin{cases} 1 & if\ p = 3 \\ 0 & if\ p > 3 \end{cases}$$

Theorem 4.5

For $L(\Gamma(Z_n))$ if $n = 5p$ where p is an odd prime number $p > 2$ then the blast transition number is zero.

Proposition 4.6

For any $G = L(\Gamma(Z_n))$, then the following conditions hold

$(i)\ \gamma(G) \leq \gamma_c^{tc}(G)$

$(ii) \tau_c^{tc}(G) \leq \gamma(G) \leq \gamma_c^{tc}(G)$

V. TYPES OF ZERO DIVISOR GRAPHS [4]

There are several types of zero divisor graphs. In this paper, we discussed about some of them. Let p, q and r be three distinct primes then the following cases arise.

One prime 5.1[4]

Anderson and Livingston graphs for which this result is trivial because they eliminated the zero divisors 0 and 1 such that these graphs have neither vertices nor edges.

All numbers in this category < 100 are 2, 3, 5,7, 11, 13, 17, 19, 23, 29, 31, 37, 41,43, 47,53,59,61,67,71,73,79,83,89, and 97

Two prime 5.2[4]

Let this be represented by pq. There are two case:

(i) p and q can be distinct.

(ii) p and q can be the same.

(i)The distinct case

If p and q are distinct then the graph will be a complete bipartite graph.

All numbers in this category < 100 are 6,10, 14, 15, 21, 22, 26, 33, 34, 35, 38, 39,46,51,55,57,58,62,65,69,74,77,82,85,86,87,91,93,94 and 95.

(i)The non-distinct case

If p and q take the same value , All numbers in this category < 100 are 9, 25, and 49.

Theorem 5.2.1

If the ϑ −obrazom of $\Gamma(Z_n)$,(distinct case <100) then,

$$\gamma_c^{tc}(L(\Gamma(Z_n)) = \begin{cases} 1 & if\ n = 2p \\ 2 & if\ n = 3p \end{cases}$$

Theorem 5.2.2

If the ϑ −obrazom of $\Gamma(Z_n)$,(non-distinct case < 100) then, $\gamma_c^{tc}(L(\Gamma(Z_n)) = \begin{cases} 2 & if\ n = 25 \\ 3 & if\ n = 49 \end{cases}$

Theorem 5.2.3

If the ϑ −obrazom of $\Gamma(Z_n)$,(distinct case < 100) then,

$$\tau_c^{tc}(L(\Gamma(Z_n)) = 0 \ \ if\ n = 2p \text{ and } 3p$$

Theorem 5.2.4

If the ϑ −obrazom of $\Gamma(Z_n)$,(non-distinct case < 100) then, $\tau_c^{tc}(L(\Gamma(Z_n)) = \begin{cases} 0 & if\ n = 25 \\ 1 & if\ n = 49 \end{cases}$

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5.3 Three primes[4]

There are three types of prime numbers which are represented by p^3, p^2q, pqr.

Case (i) p^3 when p is a prime

In this case, the graph will be a complete bipartite graph.
All numbers in this category < 100 are 8 and 27.

Case (ii) pqr when p, q, and r are primes and $p < q < r$

Each grouping of terms is a group of factors that have to do with the multiples of p, not associated with q or r, then the multiples of r associated with p or q and then the multiples of pq.
All numbers in this category < 100 are 30, 42, 66, 70, and 78.

Case (iii) p^2q when p and q are primes

The centre of this graph will be $\frac{(p^2q)}{2}$ the vertices connected to $\frac{(p^2q)}{2}$ will be multiples of pq these multiples will form a complete bipartite graph with the multiple of p that are remaining connected to $\frac{(p^2q)}{2}$ will be all remaining multiples of q. The trail vertices are rq where, r is relatively prime to q. The center node is p^2.
All numbers in this category < 100 are 12, 18, 20, 28, 44, 45, 52, 76,
50,63,68,75,92,98 and 99.

Theorem 5.3.1

For $L(\Gamma(Z_n))$, (p^3 case < 100) then the blast domination number is one.

Theorem 5.3.2

For $L(\Gamma(Z_n))$, (p^3 case < 100) then the blast transition domination number is zero

5.4 Four primes[4]

This can be represented in four different ways. p^4, p^3q, p^2qr, p^2q^2.
Case(i) If $p^4 < 100$, then the four primes are 16 and 81
Case(i) $p^3q < 100$ then the four primes are 24,40,54 and 56.
Case(i) If $p^2\ q^2 < 100$, then the four prime is 36.

Theorem 5.4.1

For $L(\Gamma(Z_n))$, then the blast domination number is given by,

Case (i) if $p^4 < 100$, then $\gamma_c^{tc}(L(\Gamma(Z_n)) = \begin{cases} 1 & if\ n = 16 \\ 5 & if\ n = 81 \end{cases}$

Case (ii) if $p^3q < 100$, then $\gamma_c^{tc}(L(\Gamma(Z_n)) = \begin{cases} 4 & if\ n = 24,54 \\ 7 & if\ n = 40,56 \end{cases}$

Case (iv) if $p^2\ q^2 < 100$, then $\gamma_c^{tc}(L(\Gamma(Z_n)) = 4$

Theorem 5.4.2

For $L(\Gamma(Z_n))$, then the blast transition domination number is given by,

Case (i) if $p^4 < 100$, then $\tau_c^{tc}(L(\Gamma(Z_n)) = \begin{cases} 0 & if\ n = 16 \\ 1 & if\ n = 81 \end{cases}$

Case (ii) if $p^3q < 100$, then $\tau_c^{tc}(L(\Gamma(Z_n)) = 1$ except $n = 40$

Case (iv) if $p^2\ q^2 < 100$, then $\tau_c^{tc}(L(\Gamma(Z_n)) = 1$

5.5 Five primes [4]

This can be represented in three different ways which are p^5, p^4q and p^3q^2.
. Case(i) If $p^5 < 100$ then the five prime is 32
Case(i) If $p^4q < 100$ then the five primes are 48 and 80.
Case(i) $p^3\ q^2 < 100$ is 72.

Theorem 5.5.1

For any $L(\Gamma(Z_n))$, then the blast domination number is given by,

Case (i) if $p^5 < 100$, then $\gamma_c^{tc}(L(\Gamma(Z_n)) = \begin{cases} 2 & if\ n = 32 \\ 5 & if\ n = 81 \end{cases}$

Case (ii) if $p^4q < 100$, then $\gamma_c^{tc}(L(\Gamma(Z_n)) = \begin{cases} 6 & if\ n = 48 \\ 10 & if\ n = 80 \end{cases}$

Case (iv) if $p^3\ q^2 < 100$, then $\gamma_c^{tc}(L(\Gamma(Z_n)) = 11$

Theorem 5.5.2

For any $L(\Gamma(Z_n))$, then the blast transition domination number is given by,

Case (i) if $p^5 < 100$, then $\tau_c^{tc}(L(\Gamma(Z_n)) = \begin{cases} 0 & if\ n = 32 \\ 1 & if\ n = 81 \end{cases}$

Case (ii) if $p^4q < 100$,

then $\tau_c^{tc}(L(\Gamma(Z_n)) = \begin{cases} 1 & if\ n = 48 \\ 3 & if\ n = 80 \end{cases}$

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Case (iv) if $p^3 q^2 < 100$, then $\tau_c^{tc}(L(\Gamma(Z_n)) = 3$

5.6 Six Primes[4]

There are only two categories to look at here where n is < 100

Case (i) If $p^6 < 100$ then the six prime is 64

Case (ii) if $p^5 q < 100$ then the six prime is 96.

Theorem 5.6.1

For any $L(\Gamma(Z_n))$, then the blast domination number is given by,

Case (i) if $p^6 < 100$, then $\gamma_c^{tc}(L(\Gamma(Z_n)) = 4$

Case (ii) if $p^5 q < 100$, then $\gamma_c^{tc}(L(\Gamma(Z_n)) = 9$

Theorem 5.6.2

For any $L(\Gamma(Z_n))$, then the blast transition domination number is given by,

Case (i) if $p^6 < 100$, then $\tau_c^{tc}(L(\Gamma(Z_n)) = 1$

Case (ii) if $p^5 q < 100$, then $\tau_c^{tc}(L(\Gamma(Z_n)) = 3$

VI. APPLICATION OF Θ-OBRAZOM OF ZERO DIVISOR GRAPHS IN ANY WORKSHOP AT AN INSTITUTION

Mathematics, the Queen of all sciences, is an essential component of all engineering disciplines. The department of Mathematics in an Institute of Higher Learning conducted a "National Workshop on current Aspect of Graph Theory and its Applications" in India.

About Workshop

In recent years, Graph Theory has established itself as an important mathematical tool in a wide variety of subjects, ranging from Chemistry to Genetics and Linguistics, and from Electrical engineering and Geography to Sociology and Architecture. The Workshop aims to highlight the recent developments on the variety of problems in Graph Theory and Graph Applications.

Topics Covered

Zero Divisors Graphs
Spectral Graph Theory
Applications of Graph Theory

Target Audience

The Workshop was extremely useful for research scholars and Post-graduate students in Mathematics interested in pursuing research in Graph Theory.

This Workshop included lot of researchers in the area of Graph theory like Domination, Labeling, Fuzzy graph theory, Coloring etc. Also researchers in Topological Indices presented. Based on this data we draw graphical representation of this Workshop.

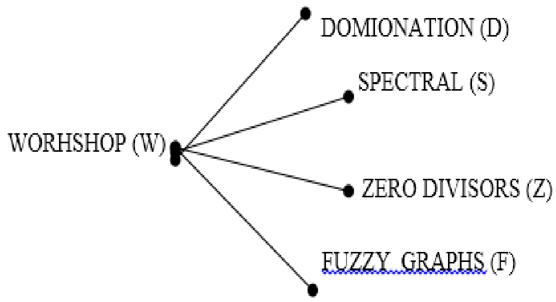

Fig 3 Graph

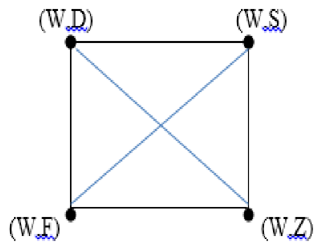

Fig 4 ϑ –obrazom Graph of G

The aspect of this graph (Workshop) is to provide a forum for the researches working on problems based on Graph theory to interact with other researchers with similar interests. They can be benefited from the invited talks and discussions with the experts in this field.

VII. APPLICATION OF BLAST DOMINATION OF ϑ – OBRAZOM OF A ZERO DIVISOR GRAPH IN WI-FI SIGNALS

This Section deals with a real life application of blast domination of ϑ –obrazom of a zero divisor graph in Wireless Fidelity signals.

Blast Domination of a Zero Divisor Graph in Wi-Fi signals

An Educational Institution has 5 blocks namely Gandhiji block, Nehru block, Kaveri block, Kamarajar block, and Abdulkalam block. An Abdulkalam block covers all maintenance, office work, Controller of Examination, and etc. Each block contains many classes, departments, and laboratories. Administrative block has main Wi-Fi connection in its own. In this administrative block, the main Wi-Fi connection server is available which serves the Wi-Fi signal connection to each blocks simultaneously but the range varies from strong to weak for the blocks because of the distance between main server and blocks is viable in this real situation. The application of blast domination of ϑ – obrazom of zero – divisor graph and its domination.

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We have given a better solution for this fluctuating signal connections running in the college blocks for getting good range of full strength connection of Wi-Fi to each block in the college campus. Through this project, we described how to give the good signal strength to all of the blocks near-by using main Wi-Fi Dongle and Local Area Network (LAN) cables.

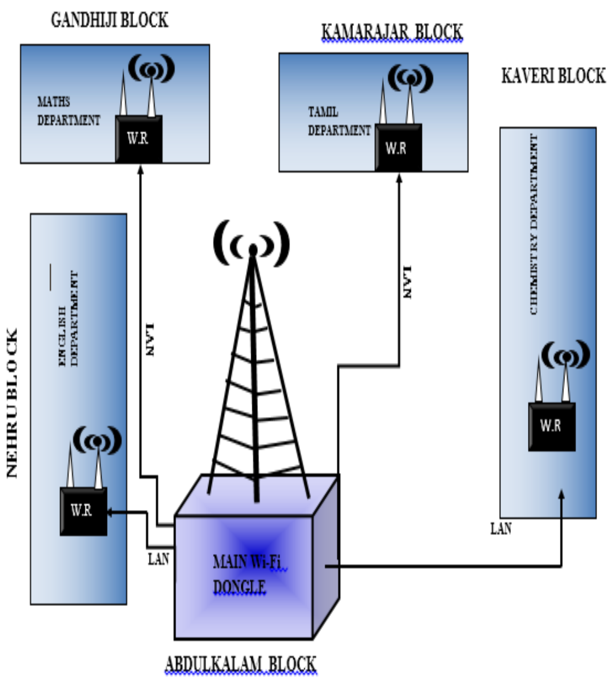
We can supply good Wi-Fi connection to each block through LAN cables and Wi-Fi Router (W.R).

In Gandhiji block, we can choose department of 'Mathematics'. In Nehru block, we can choose 'English' department. In Kaveri block, we can choose 'Chemistry' department. In Kamarajar block, we can choose 'Tamil' department, respectively.All of the 4 blocks have their own chosen departments. In each department, we fix the sub Wi-Fi Router for better signal transportation. So, the signal will pass from main server to the sub Wi-Fi Router in each block. From that sub Wi-Fi Router, other departments in that block will have their connections properly, so that every students and staffs of the Institution will get their proper good Wi-Fi signal connection for their study purpose. The purpose of the sub Wi-Fi Router connection is to provide good range of Wi-Fi connection to all the classes and departments in blocks.

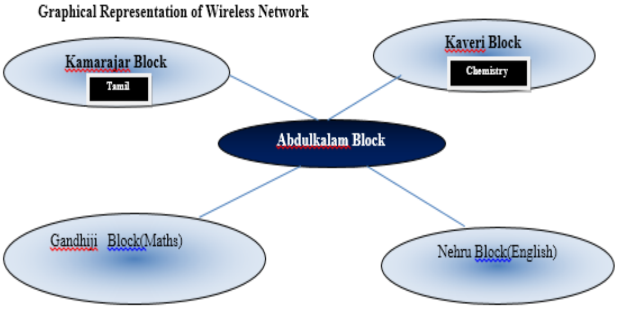
Based on star zero divisor graph $\Gamma(Z_{10})$, Wi-Fi Router gives proper signal to their adjacent blocks. The graphical representation of a Wireless network described the star zero divisor graph. It has 5 vertices, each vertex represents one block. Since the Abdulkalam block is adjacent to every other blocks namely Gandhiji block, Nehru block, Kaveri block, and Kamarajar block, Wi-Fi router produces the proper Wi-Fi signal to the specified department. Also Abdulkalam block dominates all the 4 blocks and its domination number is one.

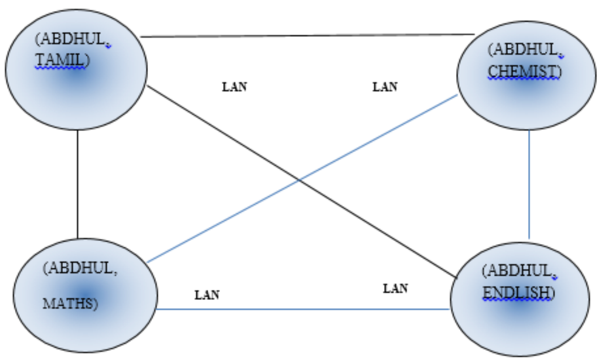
If we want to cut **(Blast)** the signal of any one block in the Campus, we can pull out the Sub Wi-Fy Router in that block, so that other blocks will receive **(Triple Connected)** their connections properly.

Wireless Network in an Educational Institution



Graphical Representation of Wireless Network





Star Zero Divisor Graph of $L(\Gamma(Z_{10}))$

VIII. CONCLUSION

In this paper, we have established about the blast domination of ϑ −obrazom of zero divisor graphs and blast transition in $L(\Gamma(Z_n))$. Further we discussed an application of ϑ −obrazom and blast domination in ϑ −obrazom of zero divisors in Wi-Fi networks. This idea can be extended to Central graphs and Total graphs of zero divisor graphs.

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