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# APPLIANCE OF GRAPH MODELS TO ASCERTAIN SOCIAL NETWORK IN PRI SYSTEM

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**ABSTRACT**
Graphs have huge contributions towards the performance upgrading aspect of social network. Some major contributors are Regular, Pascal, complete, bipartite etc. They had been studied a lot and different new characteristics were always a part of research outcome. As per requirement of interconnection network it is equivalent that suitable graphs can represent the physical and logical layout very efficiently. In this present study Pascal graph and Regular graph are researched again and have been implemented in creating social network between blocks and grampanchyats in PRI system. A numerous graph models have emerged with potentials to be used for the purpose but the new properties of the mentioned graphs are guaranteed to make an everlasting mark towards the reliability to be used as a substantial contributor for networking topology over others. The review of current research emphasizes three strands on social networks. The first strand composed of endogenous network models formed from both the economics and the computer science is highlighting the sensitive dependence of the topology on parameters of the behavioral models employed. The second strand draws from the recent econophysics literature reviewing the recent interest in the random graph theory and also allowing a mathematical tool to study social networks resulting from uncoordinated random action in setting up connections with others. The third strand focuses on a specific model of social networks where random graphs with different dependent edges are present, if edges are incident to the same node, and independent, otherwise. The experiential study reveals that these exclusive dynamic models keep the networks strongly interconnected without possibility of losing data. Thus the present paper is attempting to analyze the benefits of the network structure models and concludes with an assessment of observable consequences of optimizing behavior in networks for the purpose of estimation.

**KEYWORDS**: Pascal Graph, Regular Graph, Social Network, PRI, Block, Grampanchayats

## INTRODUCTION

The powerful combinational methods of graph theory are used to prove fundamental results in other areas of pure mathematics. While searching for a class of graphs with certain desired properties to be used as computer networks, we have found graphs that come close to being optimal. Let G = (V, E) be a graph without loops where V and E is denoted as vertices and edges respectively. One of the desired properties is that the design be simple and recursive. The inspiration of this study stemmed from consistent urge to contribute substantially in this crescendo of research from the perspective of computer network topology. We have reviewed to its characteristics and established a significant property with adequate theoretical practical support. The technique and algorithms here proposed can be used not only in the design of computer networks, but also in the design of other social network.

The current work deals with the dilemma of regional balance, differentness and effectual communication. It is seen in terms of inter-block disparities. The stress has been given to determine the levels of rearwardness in terms of economics performance, social and educational factors. To eliminate this backwardness it is essential to build up appropriate intra-block communication scheme for better communiqué between the backward areas. The administration, the biggest creator of enormous quantity of competent information and records is of paramount importance. Due to the initiation of information and communication technology (ICT), the e-government applications are being executed to progress government functioning by utilizing ICT potential. In order to meet government data needs resourcefully and effectively, the proper networking as well as databases need to be designed conforming to standard database design principles.

The accomplishment of e-governance will implement in better and faster communication of data in the blocks and its lower level [2]. This new networking model will help in performing e-governance fruitfully in the greater number of blocks under every Zilla-Parisad.

## TERMINOLOGY

### Graph

An undirected, simple, connected graph G is an ordered triple (V (G), E (G), f) consist of

- a non empty set of vertices ∈ of the graph G
- a set of edges ∈ of graph G
- A mapping f from the set of edges E to a set of unordered pair of elements of V.

### Topology

Topology is the configuration of network screening the connection of one communicating device to others. It may be static and dynamic. Dynamic topologies are efficient but circuitry is complicated and costlier.

**Network**

A network is a group of allied, communicated devices such as computers, and switches. An internet is the mishmash of two or more networks that are communicating with each other. The internet today is not a simple hierarchical structure but it is made up of wide and local area networks joined by connecting devices and switching stations. Therefore an internet is nothing but "the network of networks i.e. Super-network [12]."

**Social Network Analysis**

Social network analysis (SNA) is the methodical analysis of social networks. Social network analysis views social relationships in terms of network theory, consisting of nodes (representing individual actors within the network) and ties (which represent relationships between the individuals, such as friendship, kinship, organizational position, sexual relationships, etc). These networks are often depicted in a social network diagram, where nodes are represented as points and ties are represented as lines.

**PRI**

PRI (Panchayati Raj Institution): It is the grass root unit of self government. It has been decreed as the medium of socio-economic transformation in rural India. With the prologue of three tiers Panchayati Raj System, every village aims to be a democratic system and the powers of panchayats has been conveyed into veracity.

Levels in PRI:

- Zilla Parishad (district Level)
- Panchayat Samiti (block level)
- Grampanchayats (village level)

**Regular Graph**

In graph theory, a regular graph is a graph where each vertex has the same number of neighbors; i.e. every vertex has the same degree or valency. A regular directed graph must also satisfy the stronger condition that the indegree and outdegree of each vertex are equal to each other. A regular graph with vertices of degree *k* is called a *k*-regular graph or regular graph of degree *k*. A regular graph is a graph without loops and multiple edges. A graph is regular if the number of edges incident with a vertex is constant. This constant is called the valency, or the degree of the graph.

**Pascal Graph**

An undirected graph of n vertices analogous to PM (n) as an adjacency matrix is called Pascal Graph (n), where n is the order of the Pascal graph.

**Routing**

Routing is the procedure of moving packets across a network from one host to an. It is usually executed by fanatical devices called routers [12]. Routing [14] is a key aspect of the Internet and it, together with a great deal of deliberate redundancy of high capacity transmission lines (e.g., optical fiber cable and microwave), is a key factor in the robustness (i.e., resistance to equipment failure) of the Internet.

**Network Robustness**

The structural robustness of networks is studied using percolation theory. When a critical fraction of nodes is removed the network becomes fragmented into small clusters. This phenomenon is called percolation and it represents an order-disorder type of phase transition with critical exponents.

**Complete Graph**

A complete graph [15] is a graph in which every pair of vertices is adjacent e.g. a triangle. The following figure1 represents the simple, complete graphs K1, K2, K3, and K4 with 1, 2, 3 and 4 vertices. The complete simple graph with n vertices is denoted Kn.

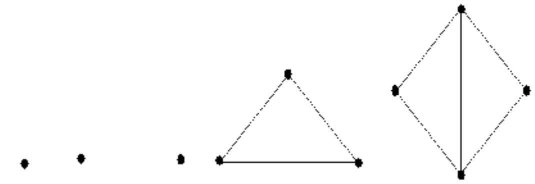



Fig.1. Complete graph

Consider the graph in Figure 2. It is not a complete graph because it is not true that every vertex is adjacent to every other vertex. However, the vertices can be divided into two disjoint sets, {1, 2,3} and { 4, 5,6} such that any two vertices chosen from the same set are not adjacent but any two vertices chosen one from each set are adjacent. Such a graph is a bipartite complete graph.

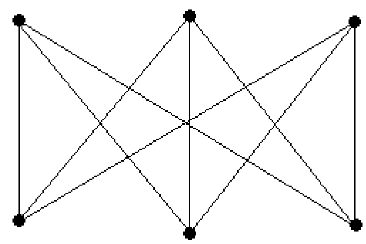


Figure 2: An example of a complete bipartite graph

**Bipartite Complete Graph**

A graph is a bipartite complete graph if its vertices can be partitioned into two disjoint nonempty sets V1 and V2 such that two vertices x and y are adjacent if and only if x € V1 and y € V2. If |V1| = m and |V2| = n, such a graph is denoted $K_{mn.}$ Therefore, the graph in Figure 2 is $K_{2,3}$

## SYNOPSIS OF PANCHAYATI RAJ SYSTEM OF INDIA

The recent research explicate about the outline of network structure of PRI system of India via approving graph models.

**The System**

Panchayati Raj Institutions– have been proclaimed as the vehicles of socio-economic transformation in rural India. Effective and significant functioning of these bodies would depend on active involvement, contribution and participation of its citizens both male and female. The aim of every village being a republic and Panchayats having powers has been interpreted into realism with the foreword of the three-tier Panchayati Raj system.

In the State level, Panchayats & Rural Development Department of the Government of West Bengal is the Nodal Agency for Implementation, Supervision & Monitoring of the major poverty mitigation programmers in the rural areas of this State. At the District-level, Zilla Parishad is the implementing agency for the same.

Under three-tier system of democratic delegation, Zilla Parishad is the zenith body at the district level followed by Panchayat Samitis at Block level as second-tier and Grampanchayats.

**PRI Structure**

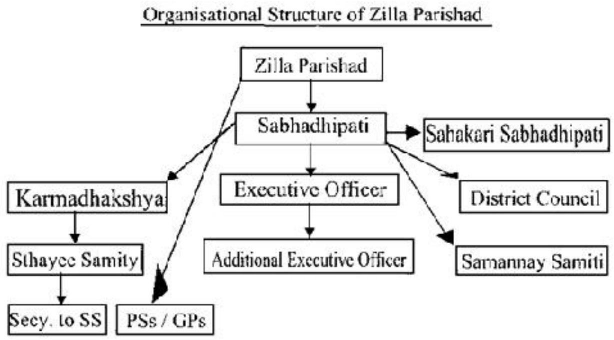
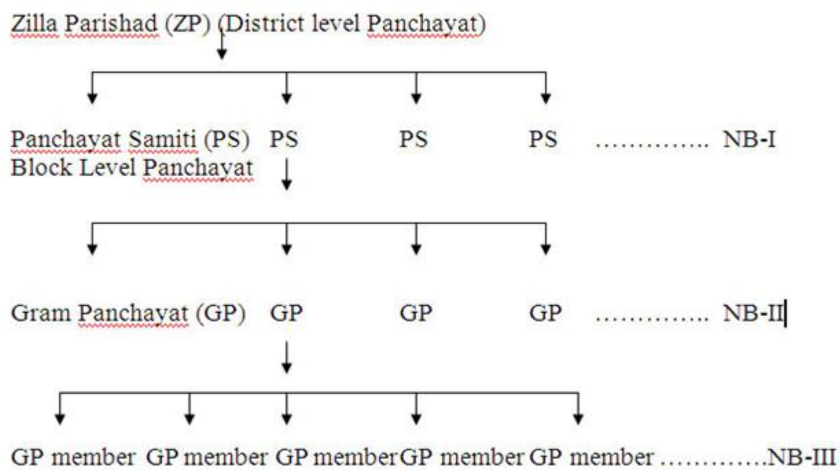



Fig3: Tabular chart of PRI system




The above chart represents Rural Local Governance System (Panchayati Raj Institutions or PRIs)

NB-I: All the Panchayat Samitis within the geographical limit of a district come under the said District Panchayat or Zilla Parishad.

NB-II: All the Grampanchayats within the geographical limit of Panchayat Samiti come under it. Panchayat Samiti and Development Block is co-Terminus.

NB-III: A Grampanchayats will have at least five and maximum of 30 members. Each member has a specified area and voters (constituency) that he represents which is called Gram Sansad (village parliament)

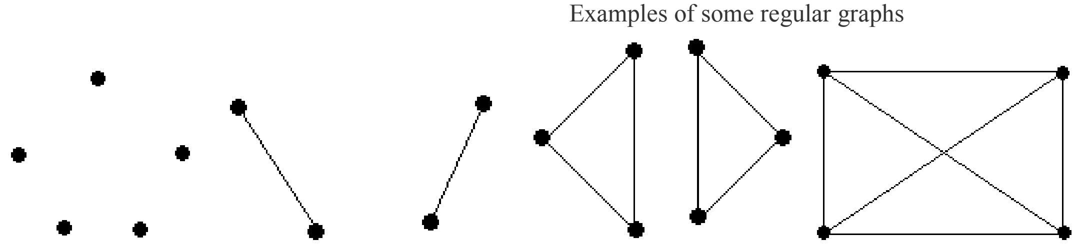
**ABSTRACT OF REGULAR GRAPH**

In this segment we are illustrating the means of representing regular graph, how cooperative and beneficial will it be in scheming topology through regular graph properties.

**Definition**

As conferred in section 2.5 regular graph is a graph wherein all nodes in the graph have the same degree. In an r-regular graph, all nodes have a degree r. The number r is called the regularity of a regular graph. Regular graphs are undirected. They need not be connected. So, a 0-regular graph is a set of nodes; a 1-regular graph is a set of disconnected edges; and so on.

Examples of some regular graphs



(a)0-regular graph (b)1-regular graph (c)2-regular graph (d)3-regular graph

Fig4: Different types of regular graph

**Features of Regular Graph**

A regular graph is a graph wherein all nodes in the graph have the same degree. In an r- regular graph, all nodes have a degree *r* being the regularity. Regular graphs are undirected. Since the total degree of any graph is even (2 * no of edges). In the fig 2 (a) represents a 0-regular graph, (b) represents a 1-regular graph, (c) represents2-regular graph and (d) represents 3-regular graph. Regular graphs with odd regularity cannot be assembled with odd number of nodes. For example, we cannot have a 3-regular graph with 7 nodes. Degree distribution is unvarying for regular graphs. Regularity need not correspond to connectivity. On an allied note, centrality distribution need not be uniform for regular graphs. It can be skewed. This is clear from the graph below in figure 3.

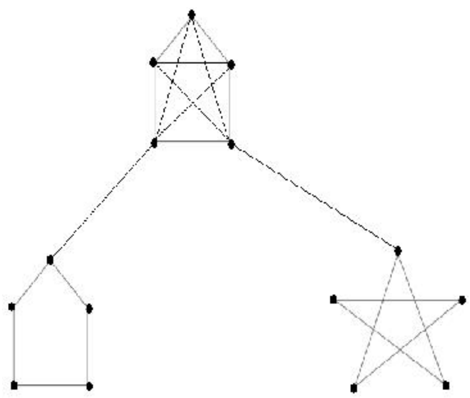


**Fig5: Non uniform distribution of regular graph**

What this entails is that regular graphs are tough only to a certain extent. They ensure uniform degree distribution but not uniform centrality distribution. Centrality distribution is a better measure of robustness than degree distribution. Here N are denotes the nodes of the graph network.

**Importance of Regular Graph**

The edge connectivity and vertex of regular graph are strong. Graph density is also very high. There is no existence of self loop and parallel connectivity in most edges. Number of edge distribution of each node is least. Bandwidth utilization will be very fine. Because of uniform distribution of edges among the nodes, it is expected in average case all the links will be used. Due to uniform distribution of links even in a higher traffic the network will give the best performance. Regular graph has the minimum number of cut-set and high reliability. Thus the damage of few links may not disconnect any node from the system. Regular graph allows extension of this model in the distributed environment due its decentralized architecture.

**Mathematical validation of regular graph**

The maximum vertex connectivity one can achieve with a graph G of n vertices and e edges (e>=n-1) is the integral part of the number $(2e/n)$; that is $\lfloor 2e/n \rfloor$. Regular graph uses this concept [14].The degree of each node is exactly $(2e/n)$ if $(2e)$ is exactly divisible by n.

This idea is extended this even when the exact regular graph formation is not possible. In that case alternative method is followed stated below.

- Firstly, a graph is constructed such that each node of the graph has the connectivity $\lfloor 2e/n \rfloor$.
- Secondly, remaining edges are added to the graph.
- Now the remaining edges are less than the number of nodes in the graph
- The nodes are added in such a way so that no node gets the connection twice.
- The nodes getting the connection in this step have degree one more than other node.
- So the degree among different nodes varies only by one.
- This can be avoided if the edges are provided so that twice the numbers of edges are divisible by number of vertices.

Generally graphs are used to construct the network model. Networking is an essential feature now a days and it exhibits a great reliability in communication among human being in various sectors. Thus according to the rules whenever the adequate blocks are available it will be rearranged according to the situation.

**Renovation of regular graph**

n=4, e=8 so d= [2*8/4] = 4 where n is taken as nodes, e as edges and d as the degree of the graph. But 2*10%2 = 2, so there are two extra edges. The two connections can be distributed in graph since it is less than no of nodes in graph, if it is more or equal to n we can adjoin one more node in graph.

**OVERVIEW OF PASCAL GRAPH**

In this section we are depicting about how Pascal graph can be represented, how advantageous and beneficial will it be in designing topology using Pascal graph and its properties.

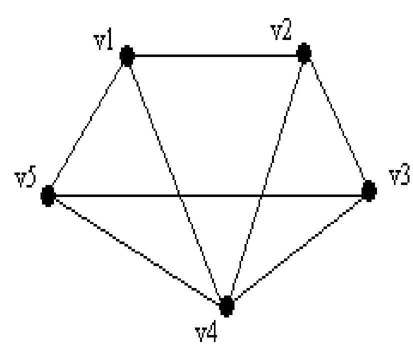
**Topology of Pascal Graph Model:**

An undirected graph of n vertices corresponding to PM (n) as an adjacency matrix is called Pascal Graph (n), where n is the order of the Pascal graph.

**Pascal Matrix**

An (n x n) symmetric binary matrix is called the Pascal Matrix PM (n) of order n if its main diagonal entries are all 0's and its lower (and therefore the upper also) consists of the first (n-1) rows of Pascal Triangle modulo 2. Where $pm_{i,j}$ denotes the element of $i^{th}$ row and $j^{th}$ column of the Pascal Matrix[5, 6, 7, 8].

An example of Pascal graphs along with associated Pascal matrices is shown in next section.



| | v1 | v2 | v3 | v4 | v5 |
|---|---|---|---|---|---|
| v1 | 0 | 1 | 0 | 1 | 1 |
| v2 | 1 | 0 | 1 | 1 | 0 |
| v3 | 0 | 1 | 0 | 1 | 1 |
| v4 | 1 | 1 | 1 | 0 | 1 |
| v5 | 1 | 0 | 1 | 1 | 0 |

**Fig 6: Pascal graph and Pascal Matrix**

**Connectivity Properties of Pascal Graph**

There are certain pragmatic properties that make Pascal graph [13, 14] a better choice for a computer network topology over many others. Some of those properties are given below:

- PG (n) is a subgraph of PG(n+1) ∀ $n \geq 1$.
- All Pascal Graph PG(i) for $i \leq 1 \leq 7$ are planner; all Pascal Graph of higher order are nonplanner.
- Vertex V1 is adjacent to all other vertices in the Pascal Graph.Vertex V1 is adjacent to Vi+1 in the Pascal graph for $i \geq 1$.
- PG (n) contains a star tree ∀ $n \geq 1$.
- PG (n) contains a Hamiltonian circuit [1, 2, 3,……, n-1, n,1].
- PG (n) contains wn-x (wheel of order n minus an edge).
- If k=2n +1, n is a positive integer, then Vk is adjacent to all Vi.
- All Pascal Graph of order ≥ 3 are 2-connected.
- No two even number of vertices of a Pascal Graph are adjacent.
- There are at least two edge disjoint path of length ≤ 2 between any two distinct vertices in PG (n), 3≤ *n*.
- If Vi is adjacent to Vj , where j is even and |i-j|>1, then I is odd and Vi is adjacent to Vj-1.
- Let det(PM(n)) refer to the determinant of the Pascal matrix of order n. Then, det(PM(n)) = 0, for all even *n* ≥ 4.
- Define e(PG(n)) to be the number of edges in PG(n), ( ( )) _( 1) log 3_ 2 *c PG n* ≤ *n* − .
- Det(PM(n)) is even for all $n \geq 3$ .

**Advantages of Pascal graph**

Pascal Graph (n) is sub graph of PG (n+1). So, blocks or nodes can be removed without any effort. It is planner up to PG (7). So, it's easy to implement. Again node-1(n) is always connected to all other nodes. So, node-1 can be considered as MAJOR (main block). Node $n_1$ is connected to $n_{2+1}$. So a sequence of connection is inbuilt.

**NETWORK PROPERTIES**

Often, Networks have certain attributes that can be calculated to analyze the properties & characteristics of the network. These Network properties often define Network Models and can be used to analyze how certain models contrast to each other. Many of the definitions for other terms used in network science can be found in Glossary of graph theory.

**Density**

The density D of a network is defined as a ratio of the number of edges E to the number of possible edges, given by the binomial coefficient $\binom{N}{2}$, giving $D = \frac{2E}{N(N-1)}$.

**Size**

The size of a network can refer to the number of nodes N or, less commonly, the number of edges E which can range from N-1 (a tree) to $E_{max}$ (a complete graph).

**Average Degree**

The degree $k$ of a node is the number of edges connected to it. Closely related to the density of a network is the average degree, $<k> = \frac{2E}{N}$. In the ER random graph model, we can compute $<k> = pN(N-1)$ where $p$ the probability of two nodes being connected is.

**Average Path Length**

Average path length is calculated by finding the shortest path between all pairs of nodes, adding them up, and then dividing by the total number of pairs. This shows us, on average, the number of steps it takes to get from one member of the network to another.

**Diameter of a Network**

As another means of measuring network graphs, we can define the diameter of a network as the longest of all the calculated shortest paths in a network. In other words, once the shortest path length from every node to all other nodes is calculated, the diameter is the longest of all the calculated path lengths. The diameter is representative of the linear size of a network.

**Clustering Coefficient**

The clustering coefficient is a measure of an "all-my-friends-know-each-other" property. This is sometimes described as the friends of my friends are my friends. More precisely, the clustering coefficient of a node is the ratio of existing links connecting a node's neighbors to each other to the maximum possible number of such links. The clustering coefficient for the entire network is the average of the clustering coefficients of all the nodes. A high clustering coefficient for a network is another indication of a small world. $C_i = \frac{2e_i}{k_i(k_i-1)}$

Maximum hypothetical connections between neighbors:

$$\binom{K}{2} = \frac{k(k-1)}{2}$$

**Connectedness**

The way in which a network is connected plays a large part into how networks are analyzed and interpreted. Networks are classified in three different categories:

- Clique/Complete Graph: a completely connected network, where all nodes are connected to every other node. These networks are symmetric in that all nodes have in-links and out-links from all others.
- Giant Component: A single connected component which contains most of the nodes in the network.
- Weakly Connected Component: A collection of nodes in which there exists a path from any node to any other, ignoring directionality of the edges.
- Strongly Connected Component: A collection of nodes in which there exists a directed path from any node to any other.

**Node Centrality**

Node centrality can be viewed as a measure of influence or importance in a network model. There exist three main measures of Centrality that are studied in Network Science.

- Closeness: represents the average distance that each node is from all other nodes in the network
- Betweeness: represents the number of shortest paths in a network that traverse through that node
- Degree/Strength: represents the amount links that a particular node possesses in a network. In a directed network, one must differentiate between in-links and out links by calculating in-degree and out-degree. The analogue to degree in a weighted network, strength is the sum of a node's edge weights. In-strength and out-strength are analogously defined for directed networks.

**MODELING AND VISUALIZATION OF NETWORKS**

Visual representation of social networks is important to understand the network data and convey the result of the analysis. Many of the analytic software have modules for network visualization. Exploration of the data is done through displaying nodes and ties in various layouts, and attributing colors, size and other advanced properties to nodes. Visual representations of networks may be a powerful method for conveying complex information, but care should be taken in interpreting node and graph properties from visual displays alone, as they may misrepresent structural properties better captured through quantitative analyses.

Collaboration graphs can be used to illustrate good and bad relationships between humans. A positive edge between two nodes denotes a positive relationship (friendship, alliance, dating) and a negative edge between two nodes denotes a negative relationship (hatred, anger). Signed social network graphs can be used to predict the future evolution of the graph. In signed social networks, there is the concept of "balanced" and "unbalanced" cycles. A balanced cycle is defined as a cycle where the product of all the signs is positive. Balanced graphs represent a group of people who are unlikely to change their opinions of the other people in the group. Unbalanced graphs represent a group of people who are very likely to change their opinions of the people in their group. For example, a group of 3 people (A, B, and C) where A and B have a positive relationship, B and C have a positive relationship, but C and A have a negative relationship is an unbalanced cycle. This group is very likely to morph into a balanced cycle, such as one where B only has a good relationship with A and both A and B have a negative relationship with C. By using the concept of balances and unbalanced cycles, the evolution of signed social network graphs can be predicted.

Especially when using social network analysis as a tool for facilitating change, different approaches of participatory network mapping have proven useful. Here participants / interviewers provide network data by actually mapping out the network (with pen and paper or digitally) during the data collection session. One benefit of this approach is that it allows researchers to collect qualitative data and ask clarifying questions while the network data is collected.[2,4]

**USE OF GRAPH MODEL IN PRI SYSTEM**

**Interconnection of Grampanchayats**

In PRI system the grampanchayats are interconnected via regular graph[14]. Hereunder the establishment of networking is explicated with a suitable regular graph model.

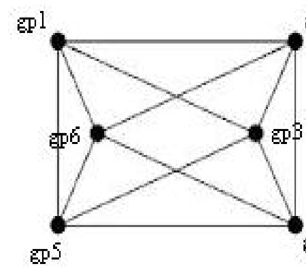



Fig 7: A 4-regular Graph

Figure 7 consists of

1. 6 nodes (gp1, gp2, gp3, gp4, gp5, gp6) represented as grampanchayats [gp] within a block. All the grampanchayats are equally interconnected with each other in the same way.
2. The connectivity are equal i.e. all the nodes have same no degree of 4.
3. Acc to mathematical calculation degree of the nodes follows [2*e/n]
4. The above formula works well in ideal situation.

Mathematical illustration of regular graph is highly applied in practical areas i.e. PRI system.

In the formula [2*e/n], n= no of nodes, e= no of edges and d=vertex connectivity similarly in PRI system the n becomes the blocks, e are the connections in between and d is the degree or grampanchayats connectivity.

7.2 Affixation of Two New grampanchyats

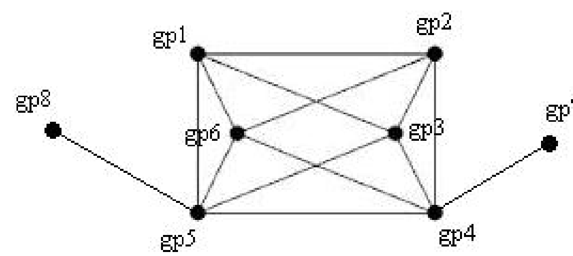



Fig8: A regular graph with addition of two new blocks

A network of grampanchyats is shown in figure 8 where two new gp of PRI system- gp7 and gp8 are come into subsistence. They are connected with the gp4 and gp5 respectively. With the rise of these new gp the degree of the gp4 and gp5 changes from 4 to 5. Thus the degree variation is of 1 acc to the rule. The GP are connected in such a way so that they don’t violate the mathematical explanation of the regular graph. Therefore regular graph helps in establishing network in PRI.

**Interconnection of Blocks in PRI system**

The blocks in the PRI system are also connected using regular graph model like the grampanchayats. The diagrammatic explanation is given hereunder.

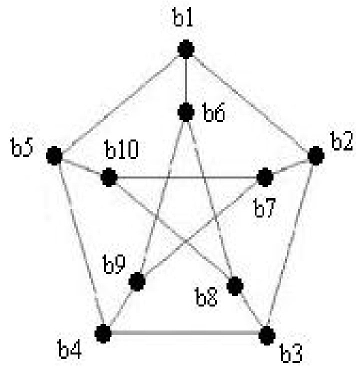



Fig9: A 3-regular graph showing interconnection of blocks

b1, b2, b3, b4, b5, b6, b7, b8 are denoted as the blocks in the prototype model in PRI as shown in figure 9. All the blocks are connected in regular graph modular way. The degree of every 8 block is 3. Thus this approach of interconnecting the blocks with the newly invented regular graph theory is quite successful.

7.4 Connection of Grampanchayats with Blocks

This is the whole new concept which is discussed in this paper. The concept has always tried to represent the different computer network topologies using appropriate graph models. In this present study Pascal graph is researched again and a new characteristics has been discovered. From the perspective of network topologies Pascal graph and its properties were first studied more than two decades back. Since then, a numerous graph models have emerged with potentials to be used as network topologies. This new property is guaranteed to make an everlasting mark towards the reliability of this graph to be used as a substantial contributor as a computer network topology. This shows its credentials over so many other topologies. This study reviews the characteristics of the Pascal graph and the new property is established using apposite algorithm and the results

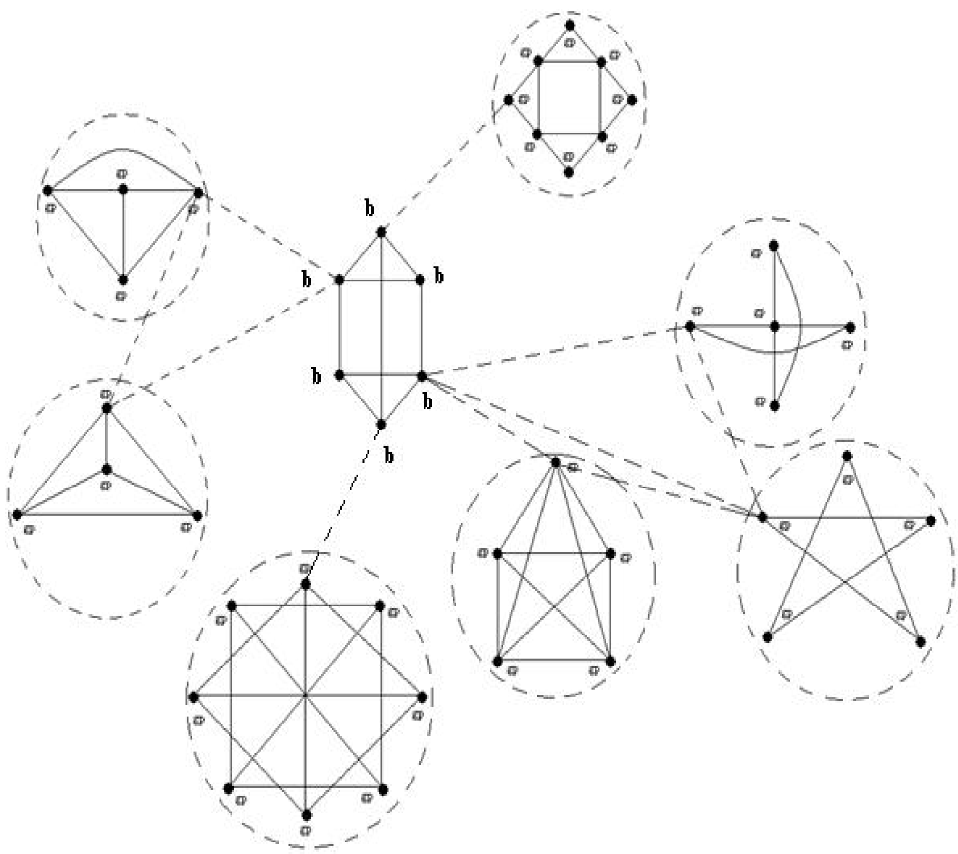


Fig10: Connection between blocks and grampanchayats in PRI system.

The connection between blocks and the grampanchayats is shown using Pascal graph model where the blocks are denoted as ‘b’ and the grampanchayats are denoted as ‘gp’ in figure 10. The representation of the Pascal relationship between the block and the gram panchyats is done by dotted line and the firm line represents the Regular graph network. There may arise dilemma at times in communicating to all GPs if there are too many grampanchayats present in one block. As a result creation of too much clogging in transferring information and messages from one GP to other is highly possible. In order to decipher the problem the blocks with higher no of GPs are divided into groups. But there may be a question in what basis the GPs are to be divided. In this situation in order to maintain uniformity, a strict rule is followed. Divisions are made in a way that each group will consist a min of 4 GP to max of 6 GP. This can be further explained with apt diagram here under.

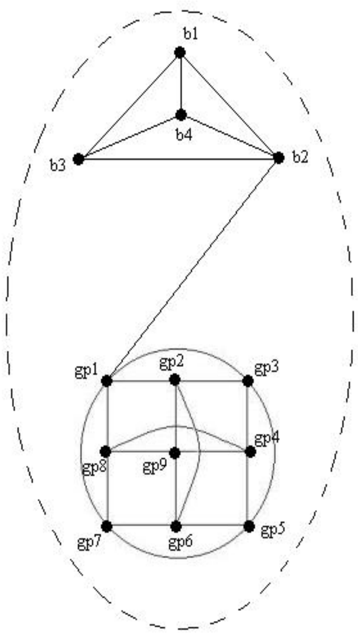
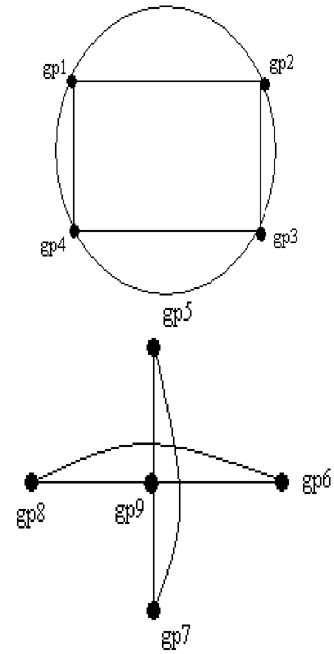



Fig11: Subgrouping of blocks/GP

A 4-regular graph repesenting a block with 9 gp and 3-regular graph showing blocks and Pascal graph is repersenting the connetion between blocks and grampanchyats.There are 9 gp as shown in figure 11 so network establishment and connecting 9 gp together can generate a mess. So to overcome the problem the whole diagram will be divided into 2 group, one containing of 4 gp and the other one is with 5 gp.. The benefit of doing this will launch communication between the GPs much more easily. Thus the main objective of this paper will be justified. The above mention scenario is again illustrated with suitable digram given hereunder.




(A) (B)

Fig12: (A) and (B) are the subgraph of Fig10

There can be also circumstances where two groups of GPs taken respectively as separate nodes and a block itself a node may altogether form a prototype unit of PRI structure. This is further illustrated with a apposite figure in the section below.

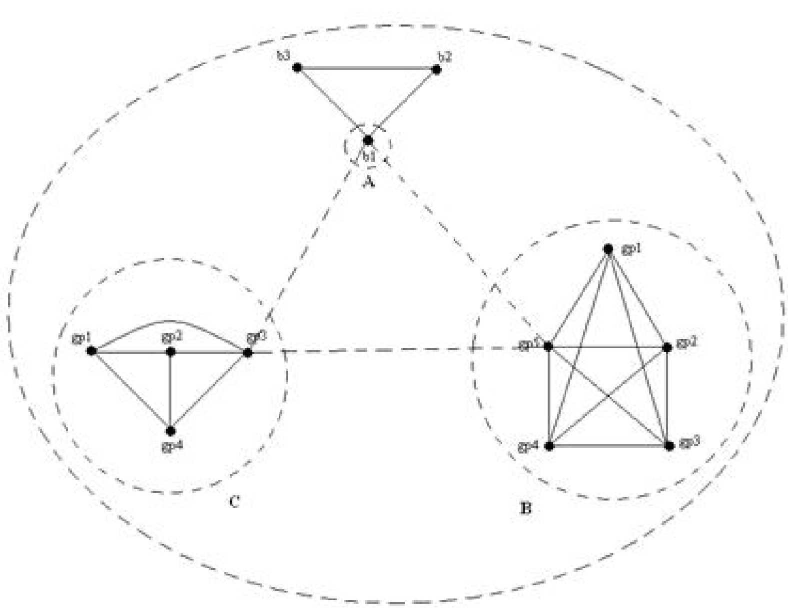



Fig 13: A connection of blocks and GPs where A, B and C are taken as separate nodes.

A, B and C are the three elements together forming figure 13. B and C are represented as separate nodes which are actually two respective collection of grampanchayats. B consisting of a bunch of 5 gp s and C is collection of 4 gp. But on the other hand unit A is one of the blocks of a 2-regular graph portrayed as a network of 3 blocks.

## USE OF GRAPH MODELS IN PRI SYSTEM

The main objectives of the present study are to find out the basic indicators to measure the severity of backwardness, to calculate the procedure for weighting or aggregating for reducing to a single measure, to find out the cut-off point below which areas are to be considered backward, to study the distribution pattern of backwardness areas in India and suggestions to reduce the levels backwardness of the districts.

The primary function of PRI in Village, Block and District level governance can be outlined as follows

Escalating draft development plan is the utmost task. PRI cooperate an important role in formulating plan for economic development and social justice. Schemes for economic development and social justice in relation to 29 subjects mentioned in Eleventh Scheduled of the Constitution are also executed by PRI. Not only this but also PRI checks that imposing and collecting taxes, duties, tolls and fees at the appropriate rates are taking place at right time in blocks and the grampanchayts. Establishment of cottage industries and small scale industries have taken place at large number. Different and innovative schemes are being applied for improvement of agriculture. Construction and maintenance of roads and bridges are also being taken care in blocks and its consecutive lower level. As discussed in sec 6.1, 6.3 and 6.4 Regular graph and Pascal graph is widely used to upgrade the network between the blocks and the lower level. The implementation of these graph models are done for the first time and it proved very effective and efficient from its very first turn.

## BENEFITS OF USING GRAPH MODELS

This paper analyzes how graph models are being used for the first time in connecting the blocks and the grampanchayats in PRI system. The application of the graph models proved quite favorable. This is completely a whole new approach which is being used. Previously various techniques and methods have been implemented to describe the PRI structure but none have ended up in a good explanation. But the clarification and the analysis that are given in this research work by the two most efficient and effective graph models- the Regular graph and the Pascal graph are very much precise and to the point. As discussed in sec 4. Regular graph is that graph where every node has same no of degree. This property when implemented in PRI system in interconnecting the blocks and the grampanchayats made the network very strong and effectual. The data can be easily transferred from one block to other and also between the grampanchayats. The loss of information while passing from one unit to another is almost negligible. Again communication is done in PRI system at ease. Not only this but also if any new blocks came into existence in the due course of time, the new blocks or gram panchayts are connected to the existing model very easily without any hazards or possibility of losing data. Communication is also set up between this new blocks or gram panchyats to advance and match its level with the existing model in a proficient way. Structure thus developed using regular graph is very much well structured, strongly connected and well planned. Again as we discussed in section 5.Pascal graph is that graph where every $n^{th}$ node always remain connected with $(n-1)^{th}$ node. Using this property the blocks are connected with the gram panchayts making the model a tighter one. Another important property of Pascal graph is that one of the nodes remains connected with rest of the nodes in the model. This very property gives a faithful assurance that loss of any sort of data can easily be avoided. Thus like regular graph, Pascal graph also helps in communicating the blocks with the grampanchayats and data are also transferred effortlessly. Thus in a scenario where there is no good method or model or process to describe the structure in PRI system properly the new approach and effort made by the previously mentioned graph models proved quite beneficial. The elaboration and illustration given by these graph models on the pretext of connection of the blocks and the grampanchayats is in an uncomplicated way. Thus its simplicity, efficient and effective properties make it easily accessible to everyone. Further entity relationship diagram and data flow diagram can be made with the analysis of the graph models and thus in turn software project development process can also be initialized from this point.

## CONCLUSION

The main objective of this research work is to establish a strong network between the blocks and the grampanchayats in PRI system. A sincere attempt is being taken to fulfill its goal using two newly introduced model of graph model i.e. Regular graph and Pascal graph. Regular graph with its simple properties provides a good aid in networking in between the blocks and the grampanchayats respectively. The Regular graph has been generated along with some extra details e.g. the degree of particular node and its index. On the other hand Pascal graph also simplifies the task of connecting the blocks with the lower level. Therefore the Pascal graph is at a precise level of reliability. Thus communicating between these units in PRI system is no longer troublesome. As a result of this all the basic sector of PRI system made a good progress towards betterment and modernization. The sectors include from administrative unit, financial, health, wealth to primary education and even higher education.

## REFERENCE

[1] N. Deo and Michael J. Quinn, “Pascal Graphs and their Properties”, Fibonacci Quarterly, vol.21, pp. 203-214, 1983.

[2] S. Chatterjee and S. S. Sarma, “In Search of a Versatile and Flexible Graph Model to Implement Computer Network”, Proceeding of International Conference on Communications, Devices and Intelligent Systems, pp. 635-638, 2004.

[3] S. S. Sarma and S. K. Bandyopadhyay, “Properties and Generation of Some special Graph”, AMSE Review,Vol. II, pp. 7-18, 1989.

[4] N. Deo. Graph Theory with Applications to Engineering and Computer Science. Englewood Cliffs, N.J.: Prentice-Hall, 1974.

[5] F. Harary. "The Determinant of the Adjacency Matrix of a Graph." SIAM, Review 4 (1962):202-10.

[6] C. T. Long. "Pascalfs Triangle Modulo p." The Fibonacci Quarterly 19 (1981):458-63.

[7] W. F. Lunno'n. "The Pascal Matrix." The Fibonacci Quarterly 15 (1977): 201-04.

[8] V. A. Uspenskii. Pascalfs Triangle. Trans, and adapted from the Russian by D.J. Sookne & T. McLarnan. Chicago: University of Chicago Press, 1974.

[9] Yannis M. Ioannides, Random Graphs and Social Networks: An Economics Perspective, http://ideas.repec.org/p/tuf/tuftec/0518.html

[10] http://en.wikipedia.org/wiki/Collaboration_graph

.

[11] http://en.wikipedia.org/wiki/Social_network_analysis

[12] http://en.wikipedia.org/wiki/Network_science

[13] Sanjay Kumar Pal and Samar Sen Sarma, “Computer Network Topology Design in Limelight of Pascal Graph Property”, In the International Journal of Next Generation Network, Vol. 2, No. 1, page: 30 – 35, 2010.

[14] An Algorithm of Topology Design and Routing, In the International Journal of Applied Research on Information technology and Computing, Vol: 1, Issue: 3, pg: 336-343, December 2010.

[15] J.L. Gersting, Mathematical Structures For Computer Science. W.H. Freeman and Company, 2007